Application Note
Siemens PLC and SIMATIC STEP 7 / TIA Portal

This document guides you through the setup of proprietary vendor specific software installed on your PC. Your supervisor may provide you with additional or alternative instructions.

The document consists of standard instructions that may not fit your particular solution. Please visit our support website for latest revisions of documentation and firmware:

http://www.secomea.com

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Prerequisite for this guide

The following guide will assist you to setup a remote and online connection to the Siemens PLC equipment placed on the customer site using your Siemens SIMATIC S7 PLC or TIA Portal programming software installed on your PC.

Prerequisites for this guide are:

- You have an operational LinkManager installed on your PC with a GateManager certificate that allows you to connect to the SiteManager agents.
- You have the Siemens software installed.
- You have the Siemens device agent installed and configured on the SiteManager at the remote site, and there is access between the SiteManager and the Siemens PLC via one of the following connection methods:
  - PLC with a native Ethernet module, such as the CP-343 SIMATIC NET for S-300, or the integrated interface of a S-1200.
  - MPI equipped PLC such as the Siemens S-300 series connected via a RS232-to-MPI adapter configured with agent device type **Siemens / MPI (Seriel)** on the SiteManager.

    Note: Secomea has stopped providing SE MPI100 due to incompatibility problems with the Siemens TIA portal)
  - PPI equipped PLC such as the Siemens S-200 series connected via a RS232-to-PPI adapter configured with agent device type **Siemens / PPI (Seriel)** on the SiteManager.

    Note: Secomea has stopped providing the SE PPI100 adapter due to incompatibility problems with the 64 versions of the Siemens Step7 and TIA portal programs. Also note that PPI require optimal bandwidth for both the LinkManager and the SiteManager, due to the PPI protocol and Siemens software per design does not take into account the transmission delays (latency) that may occur when relaying the communication over long distances.)
  - Ethernet equipped PLC configured with agent device type **Siemens / Ethernet** on the SiteManager.
  - PLC connected via an Ethernet-to-MPI adapter (such as the Hilscher netX NL 50-MPI) with agent device type **Hilscher / NetLink Gateway** on the SiteManager.
  - MPI equipped PLC connected via a Siemens Simatic S7 PC Adapter USB Model (6ES7 972-0CB20-0XA0) or Model A2 (6GK1-5710BA00-0AA0) configured with agent device type **Siemens / USB Adapter** on the SiteManager. ***NOTE*** *that the LinkManager and SiteManager must be version* ***14115*** *or later*.

If this is not the case, we kindly ask you to contact the person / department responsible within your own company or at the company responsible hereof.

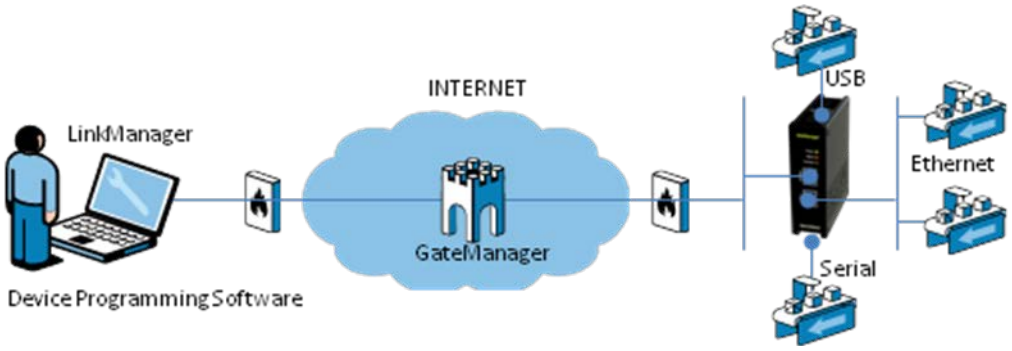
System overview

The communication path is as follows:

Siemens Software → LinkManager → GateManager → SiteManager → PLC.

This guide will elaborate on the components marked with **bold.**

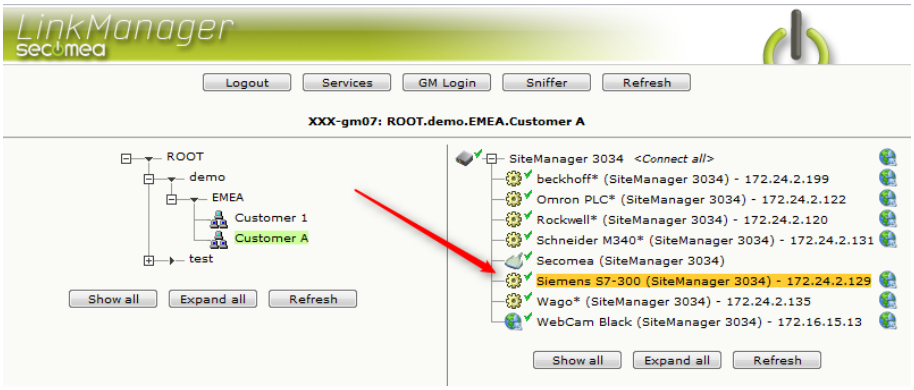
The following system overview depicts a SiteManager 3229 at the customer location:



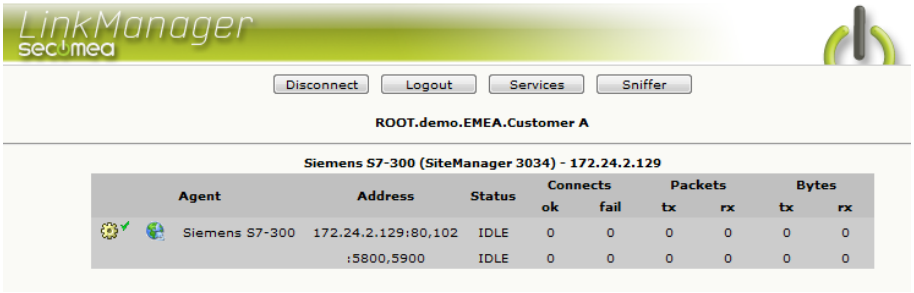
1. STEP7: TCP connection via native Siemens Ethernet port

The following describes how to connect the SIMATIC STEP 7 program to a Siemens PLC with a native Ethernet module, such as the CP-343 SIMATIC NET for S-300 or the integrated Ethernet port of e.g. an S-1200.

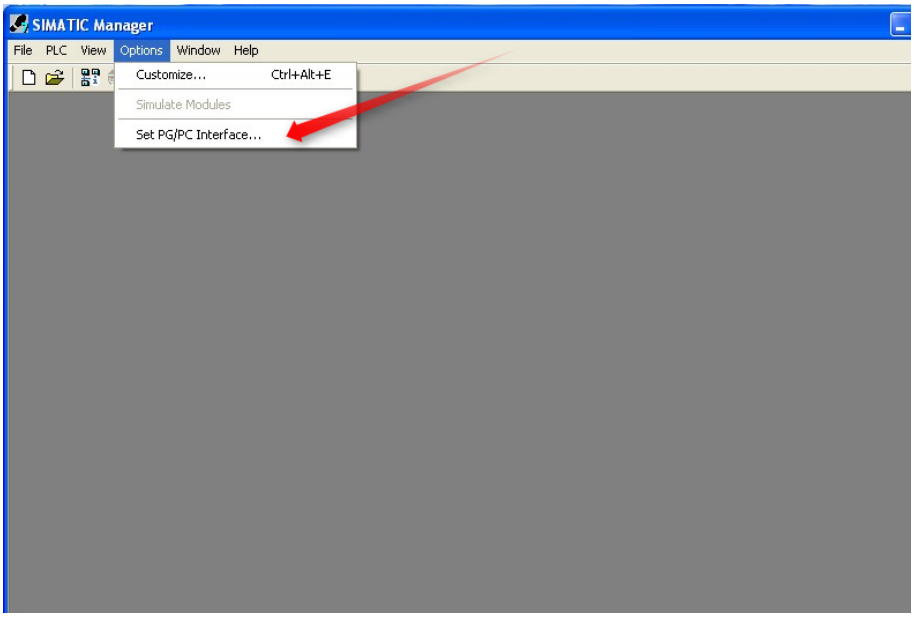
1. Locate the agent that represents you TCPI/IP attached Siemens PLC



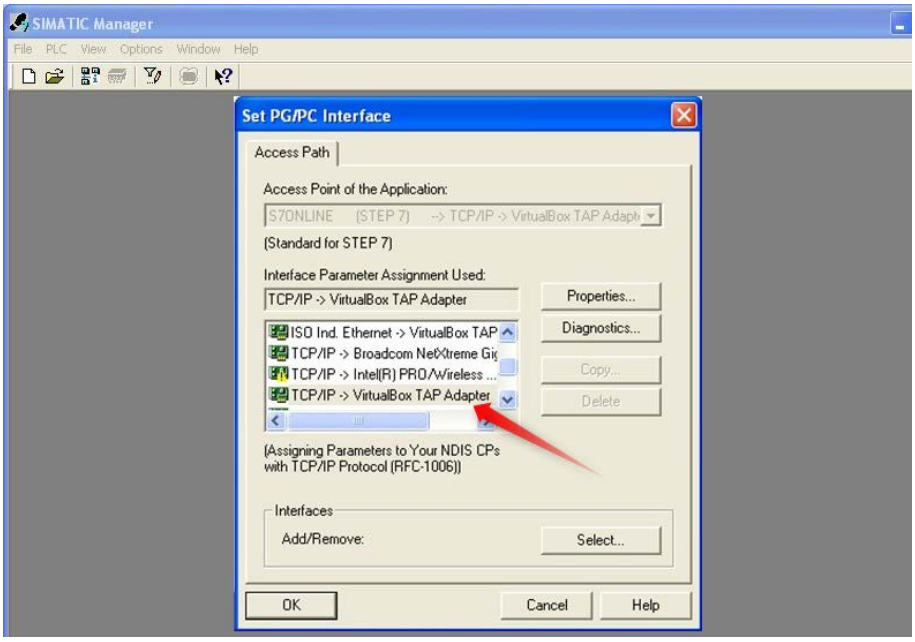
2. You will not see any activity on it yet. This only starts when you connect to the PLC via your project:



3. Start the STEP 7 software and select **Options → Set PG/PC Interface**:



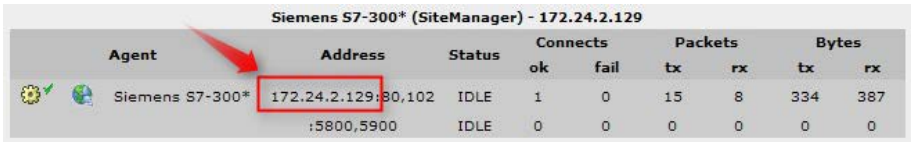
4. Select **TCP/IP -> VirtualBox TAP Adapter:**

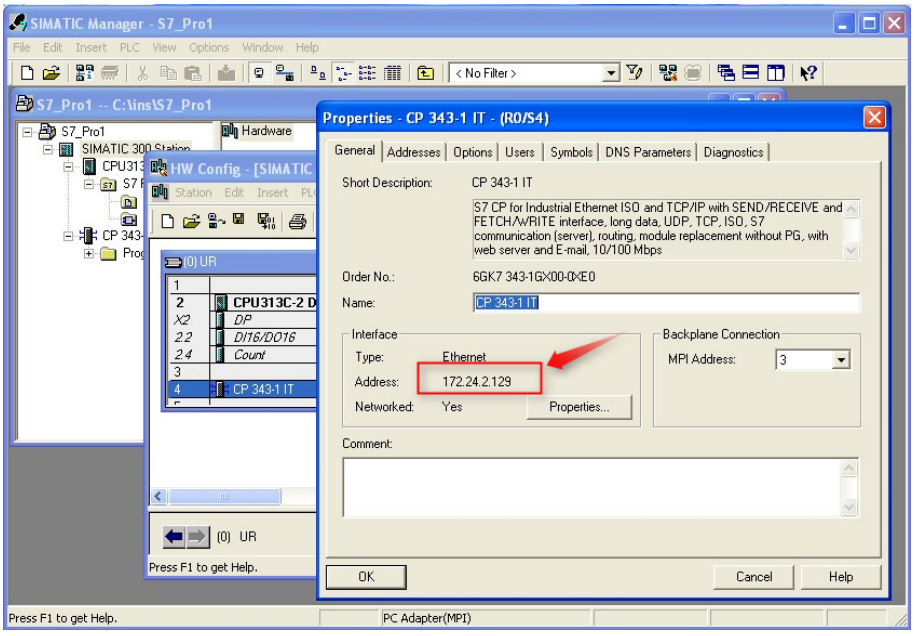


5. Press **OK** to save.

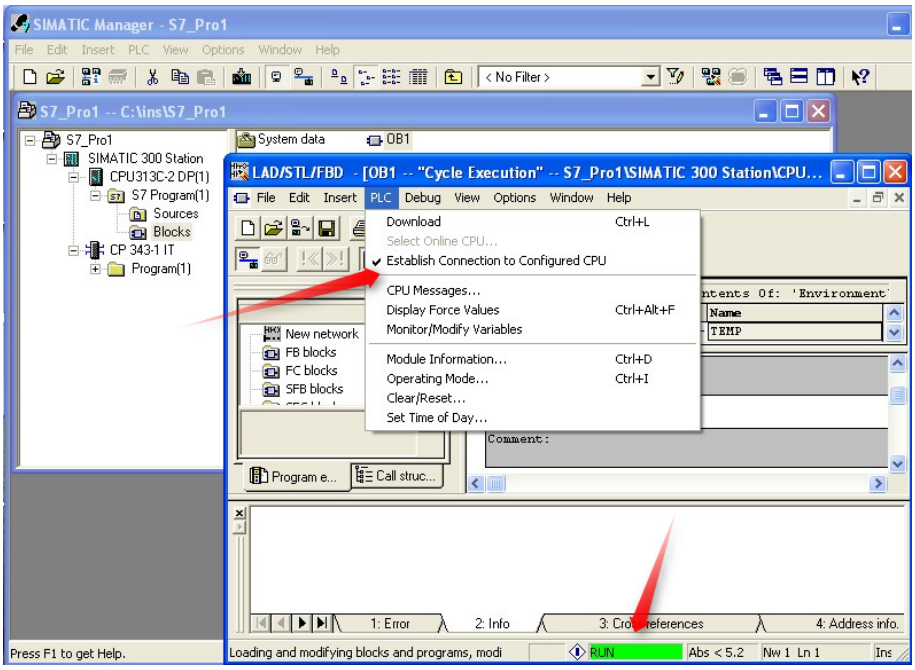
   NOTE: The LinkManager does not allow STEP 7 to scan for network attached devices. Therefore you will NOT see the PLC under the menu **PLC → Display Accessible Nodes.** Neither will you see any activity on the LinkManager before you access it with a project where the PLC's specific IP address is configured.

6. Open your project, and make sure your project have the IP address configured to match the address of the LinkManager agent.





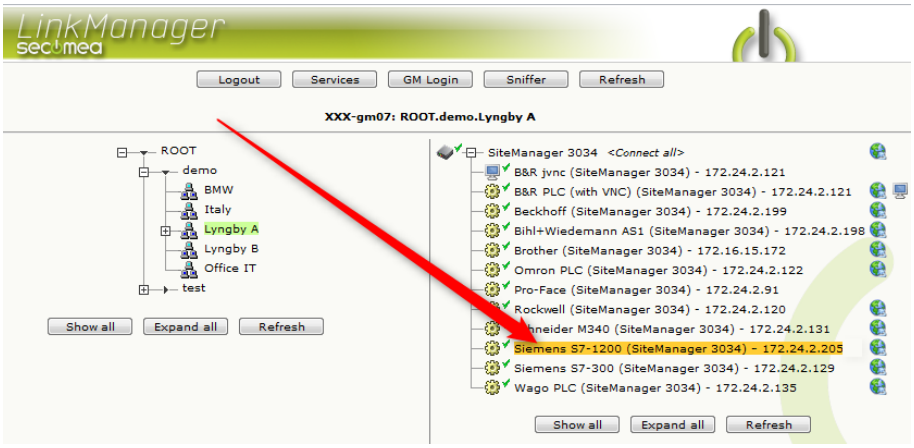
7. In the project select **PLC → Establish Connection to Configured CPU**. You should see the green RUN indication at the bottom..



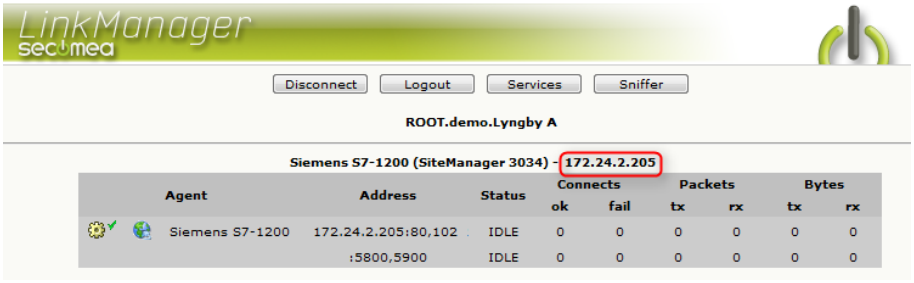
2. TIA Portal: TCP connection via native Siemens Ethernet port

The following describes how to connect via the Siemens TIA portal to a Siemens S7-1200 PLC equipped with an Ethernet module that is attached to a SiteManager via Ethernet (directly or via an Ethernet switch).

1. Login with your LinkManager and locate the agent that represents your TCPI/IP attached PLC. Click the text (that turns orange at mouse over) to connect to the PLC.



2. You will not see any activity on it yet. This only starts when you connect to the PLC via your project (Make a note of the IP address of the PLC):



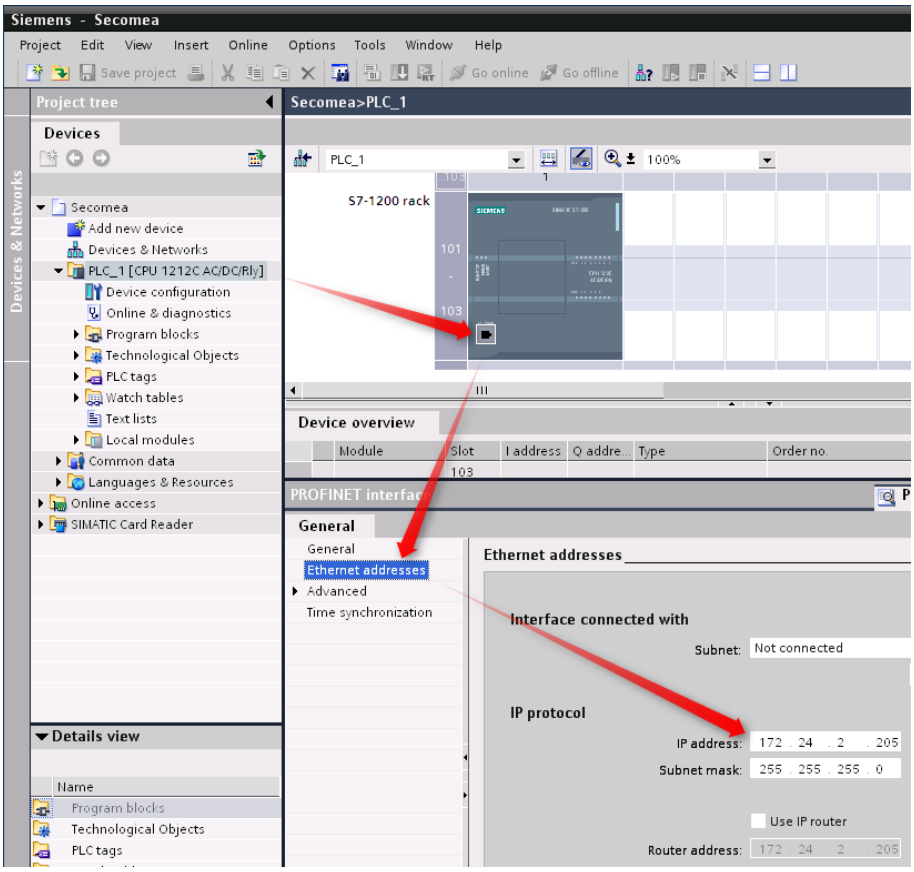
Hint: You are in principle now connected to the PLC, and you could make a ping to the PLC IP address.

3. Start the TIA portal and communicate on the IP address as you would normally have done if you were sitting in the local network with the PLC. The following illustrates some basic screenshots:

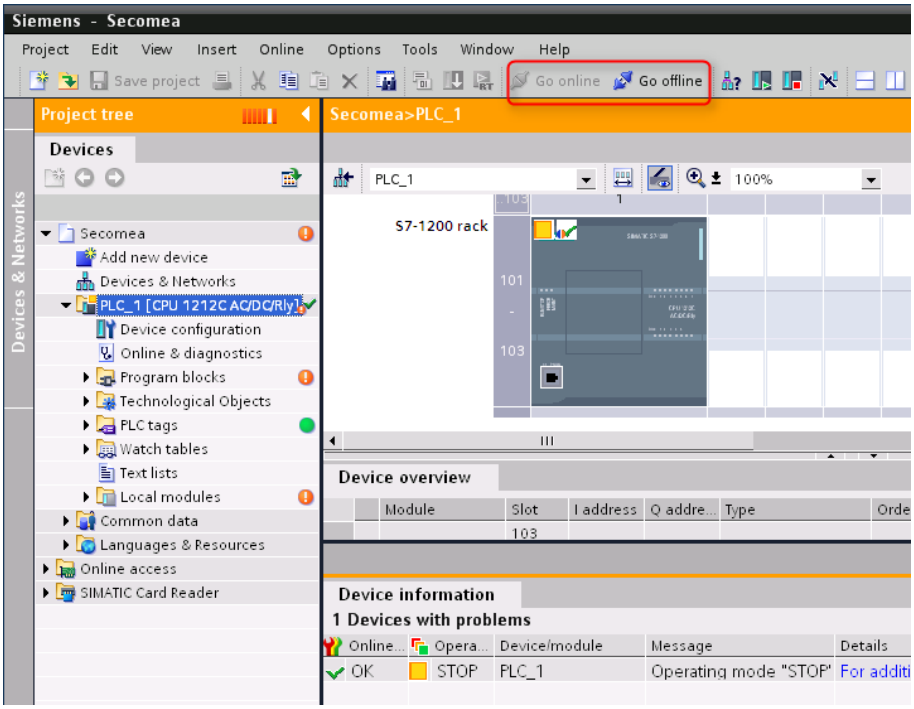
NOTE: The TIA portal's network discovery function will not work via the LinkManager connection, due to the nature of UDP broadcasts being limited to the physical local subnet. I.e. it will not work either to us the TIA portals ability to apply another subnet to the PG/PC interface.

4. Open your project in the TIA portal and enter project view.

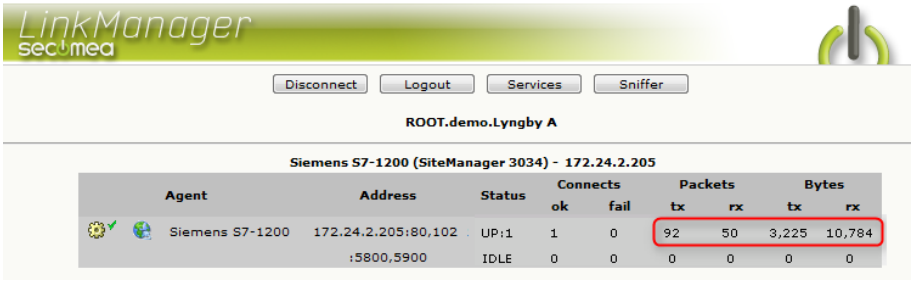
5. Ensure that your project is configured with the IP address that the LinkManager is connected to, by selecting the PLC



6. If matching the LinkManager, you can go Online on the PC.



7. You can now also observe data traffic in the LinkManager:



3. MPI or PPI connection via RS232-to-MPI/PPI Adapter

The following describes how to connect to the SIMATIC program, to a Siemens PLC that is attached to a SiteManager via a Siemens RS232-to-MPI or RS232-to-PPI adapter or the Secomea SE MPI100 or SE PPI100.

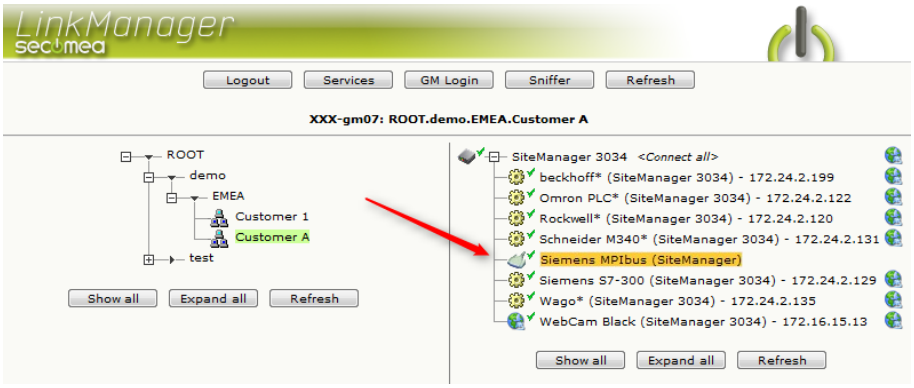
NOTE: This only applies to the 32 bit versions of the Step7 and TIA portal program. In the 64 bit versions of these programs the COM port driver has been removed, and you should use either the method described in section **4.MPI connection via Siemens PC USB Adapter** or **5.MPI or PPI connection via netX NL 50-MPI**/PPI adapter.

Ethernet-to-MPI/PPI are generally higher priced than RS232-to-MPI/PPI adapters, but you will also benefit from better performance and allows access to MPI/PPI/Profibus DP 1,5 and 12Mbit networks. Secomea has standardized on the Hilscher netLINK NL 50-MPI (Secomea part number 26940).

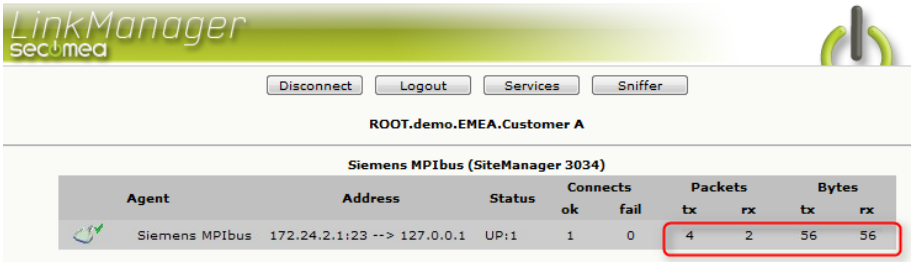
Also note about RS232-to-PPI, that this communication form is sensitive to the speed of the connection. For very slow connections with high latency, you may experience instability or event that it does not work at all.

The following illustrates setup of a MPI connection via Step7.

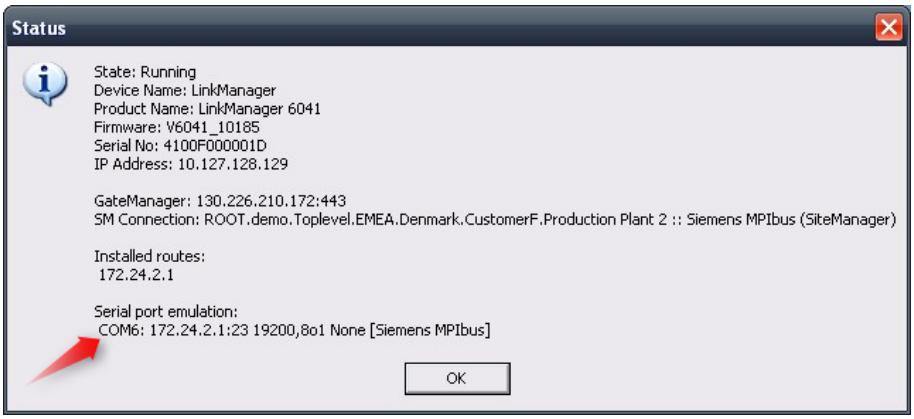
1. Locate the agent that represents you Serial Siemens PLC.



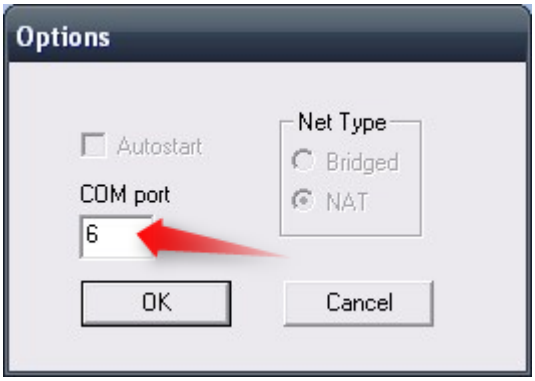
2. When connecting the agent, you should see some activity in the tray icon area, which is the auto configuring of a virtual serial port. If your SiteManager, the MPI100 and the Siemens PLC is correctly attached, you should also see the status of the agent change to UP, and a few bytes of traffic:



3. Now right click the LinkManager system tray Icon, and select **Status**. Make note of the Serial port that has been assigned (in this case COM6):



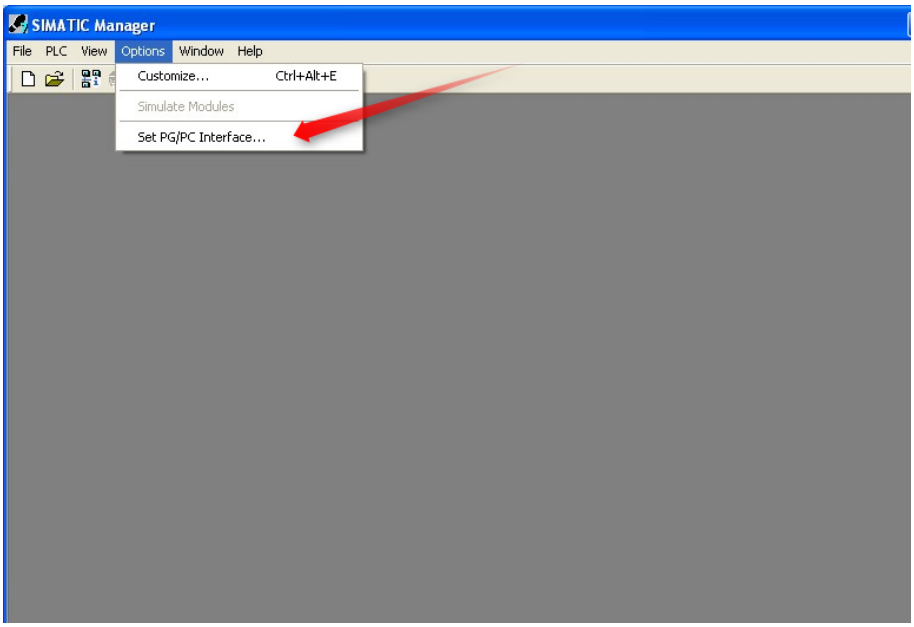
4. Right click the LinkManager system tray icon again, and select **Options**. Enter the number of the COM port you found under status. This will ensure that you will always get this port in the future.



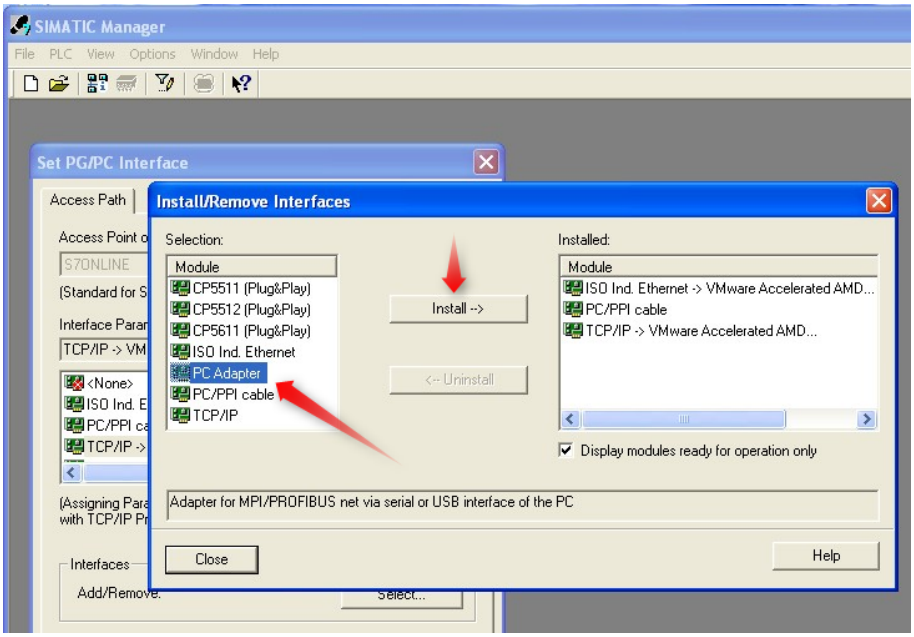
Important: You must stop and start the LinkManager for the forced port to take effect

Tip: You can also force another COM port (e.g. COM2). Just ensure in your Windows device manager, that the port is not conflicting with an existing COM port. See Appendix A for info on how to organize COM ports.

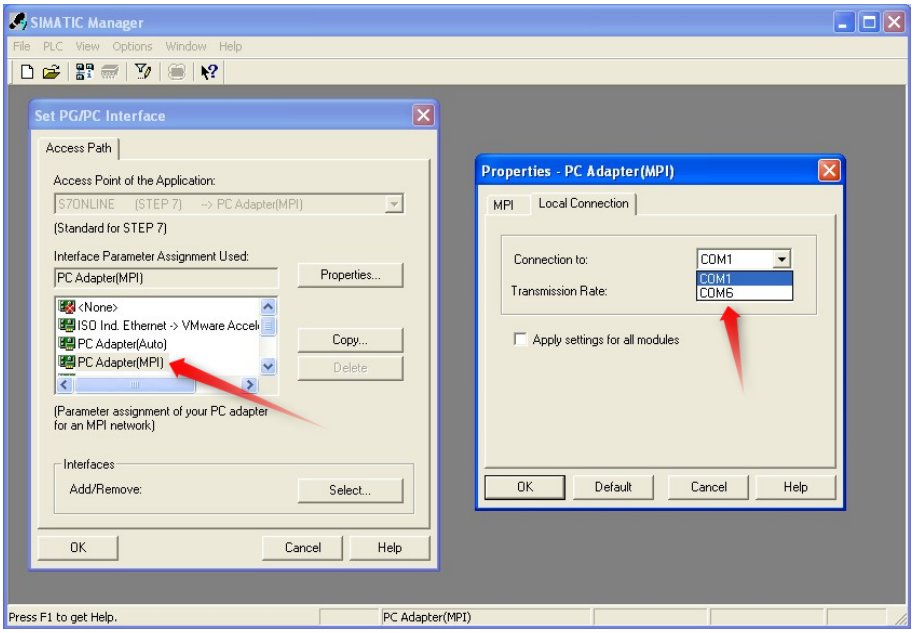
5. In the SIMATIC program, select **Options → Set PG/PC interface**:



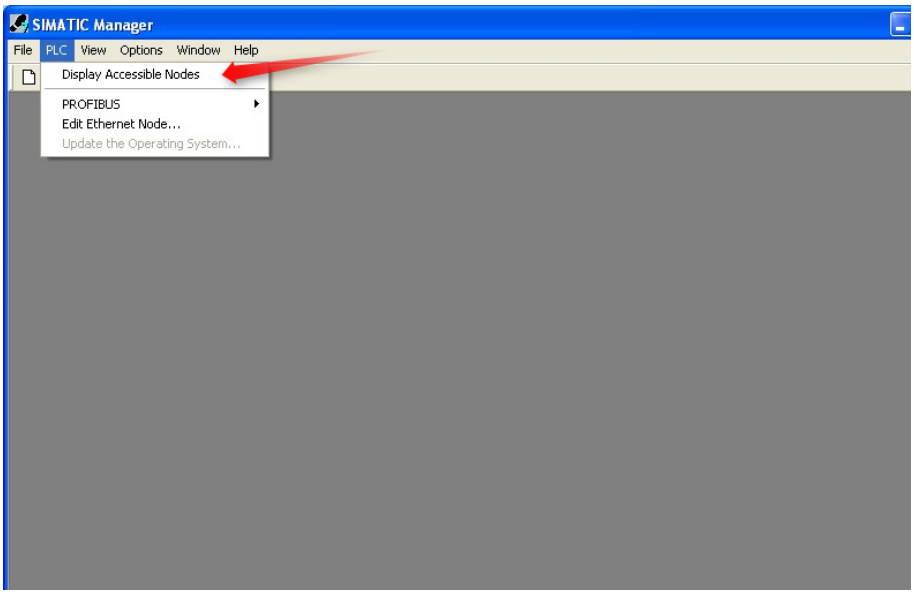
6. Select **PC Adapter(MPI)**, If you do not see this adapter in the list, click **Select** and install the PC Adapter:



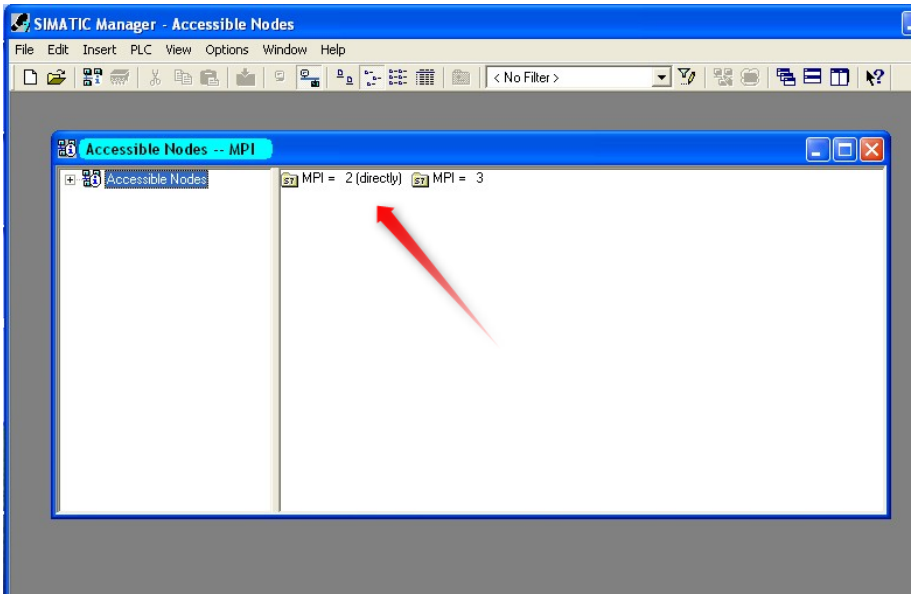
7. For the **PC Adapter (MPI)**, select properties and select the COM port you found on the LinkManager Status screen. (Make sure that “Apply settings for all modules” is NOT checked)



8. In the SIMATIC software select **PLC → Display Accessible Nodes**



9. If the SIMATIC software displays some accessible MPI nodes, you have configured everything correctly, and you should be able to start a project and communicate with the PLC.



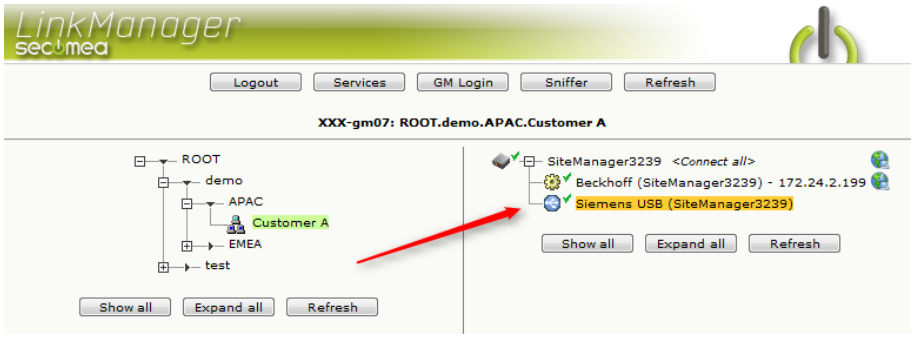
4. MPI connection via Siemens PC USB Adapter

The following describes how to connect to a Siemens PLC that is attached to a SiteManager via a Siemens PC USB adapter. The following screenshots depicts the SIMATIC Step7 software)

Both the Siemens Simatic S7 PC Adapter USB 6ES7 972-0CB20-0XA0 (hardware revision 1.2 and 1.3), and USB A2 6GK1-5710BA00-0AA0 have been verified to work.

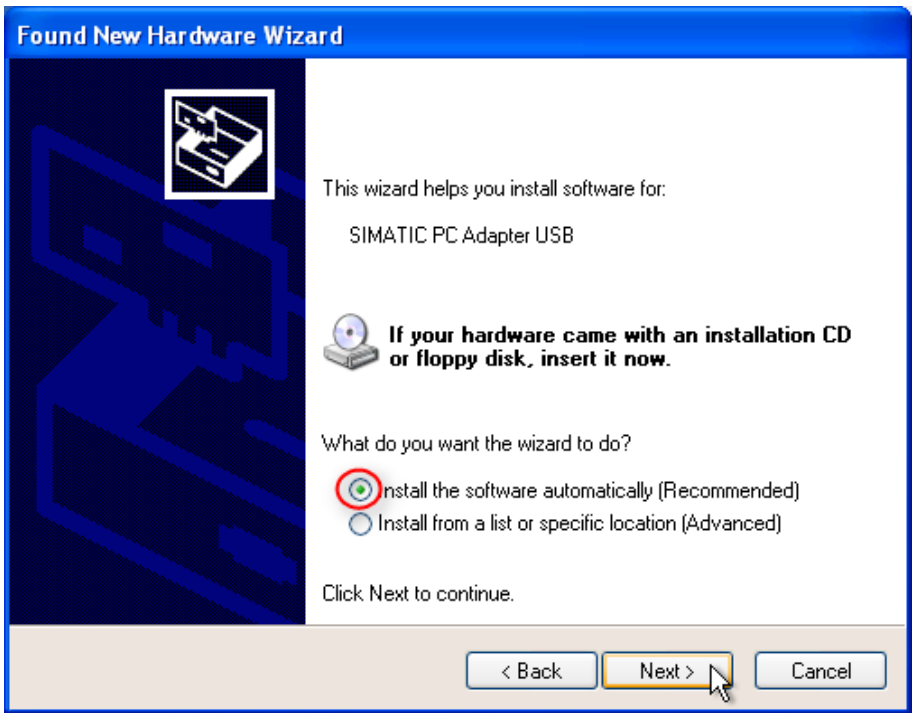
***NOTE**: that SiteManager and LinkManager version must be **14115** or later*

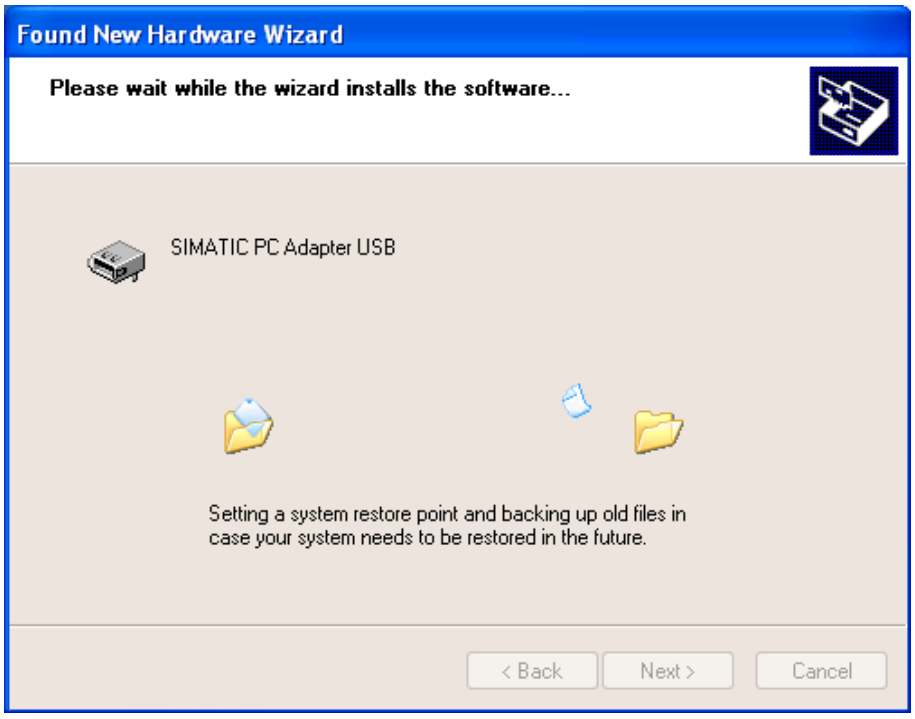
1. Locate the agent that represents you USB Siemens PLC, and connect to it.

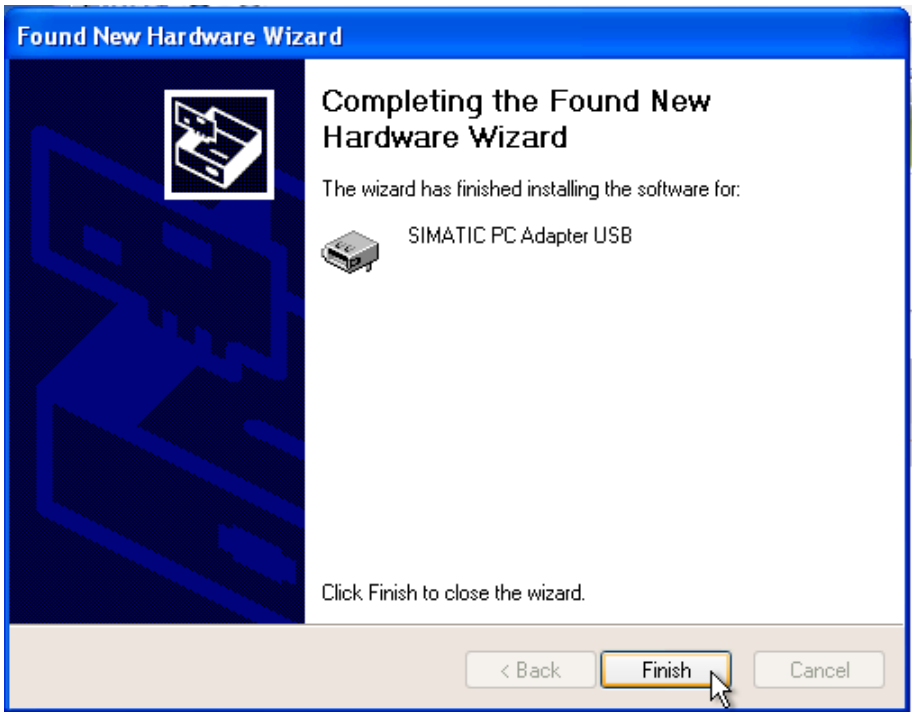


2. First time the connection is opened, the "Found New Hardware" Wizard will pop up. Select to not search for drivers on Windows Update site:

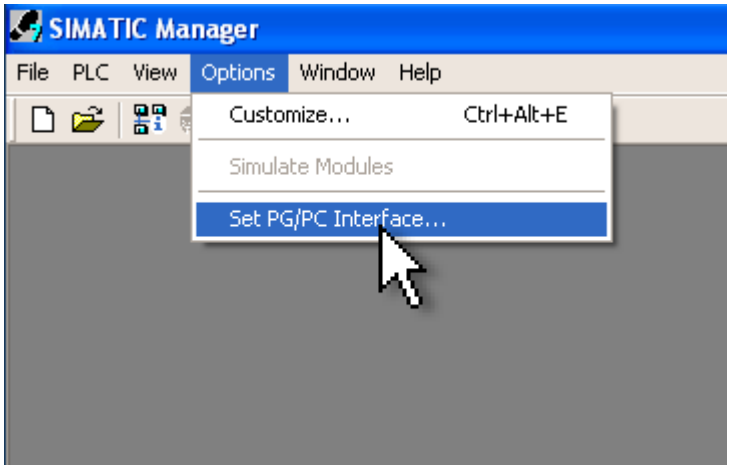
3. Select “Install the software automatically”, click **Next** and the process should proceed automatically.



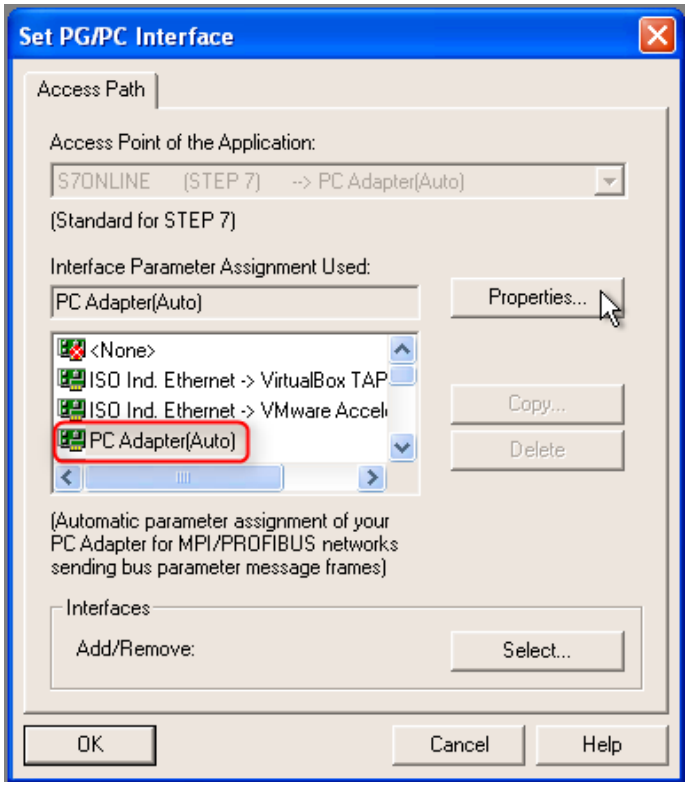




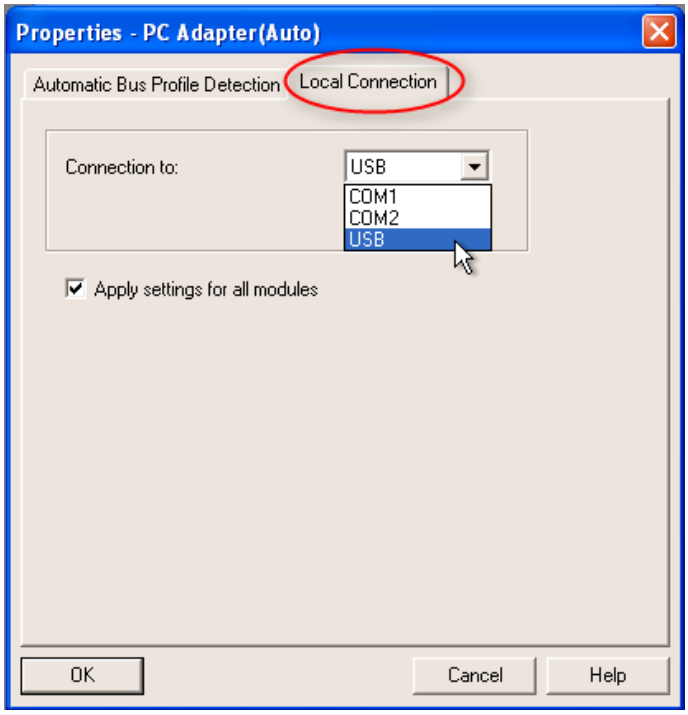
4. Start the SIMATIC Manager program, and select **Options → Set PG/PC Interface**.



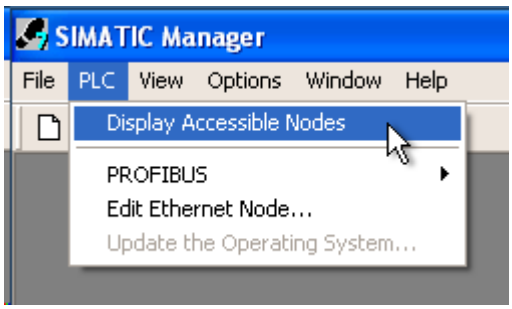
5. Select “PC Adapter (Auto) from the list, and click **Properties**.

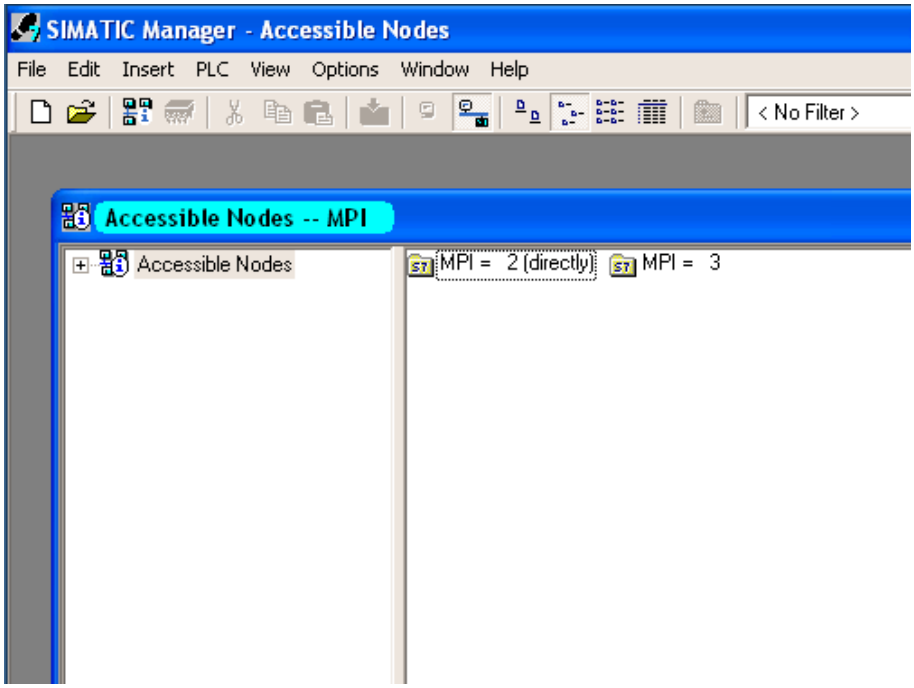


6. Select “Local Connection” and choose USB from the dropdown menu. Click **OK** twice.



7. Now, you should be able to access the PLC via the USB PC Adapter. To get a list of available nodes, select **PLC → Display Accessible Nodes**.





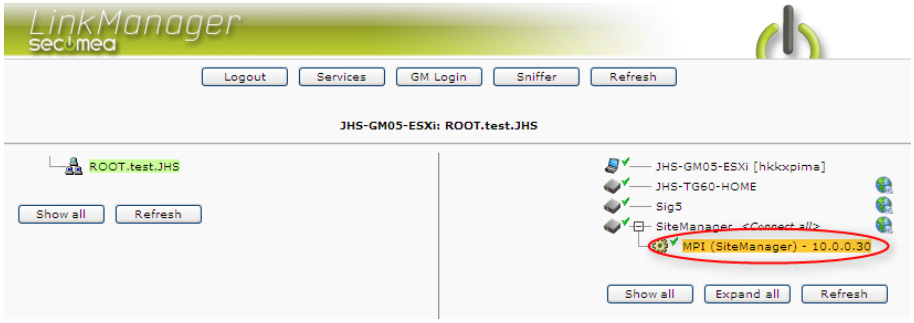
5. MPI or PPI connection via netX NL 50-MPI/PPI adapter

The following describes how to connect the SIMATIC program, to a Siemens PLC that is attached to a SiteManager via a Hilscher netX NL 50-MPI/PPI adapter (Secomea part number 26940).

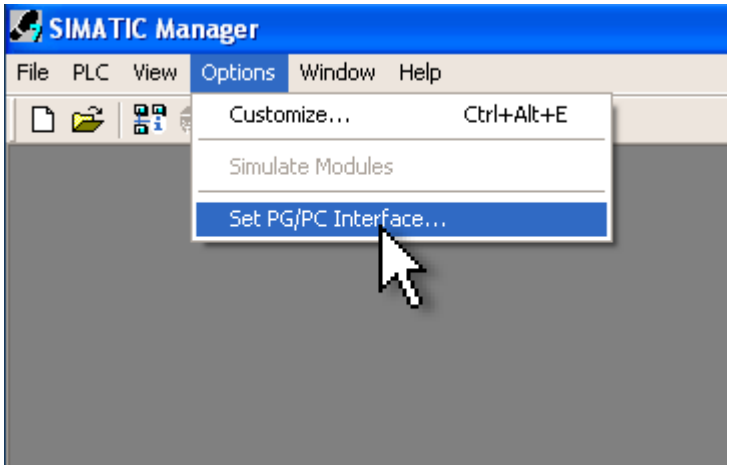
Important: The IP address of the NL-50 adapter must be configured locally and saved permanently into the adapter before shipping it to the final destination. You cannot set the IP address on a new NetX adapter remotely via a LinkManager connection.

The following depicts the SIMATIC Step7 software only.

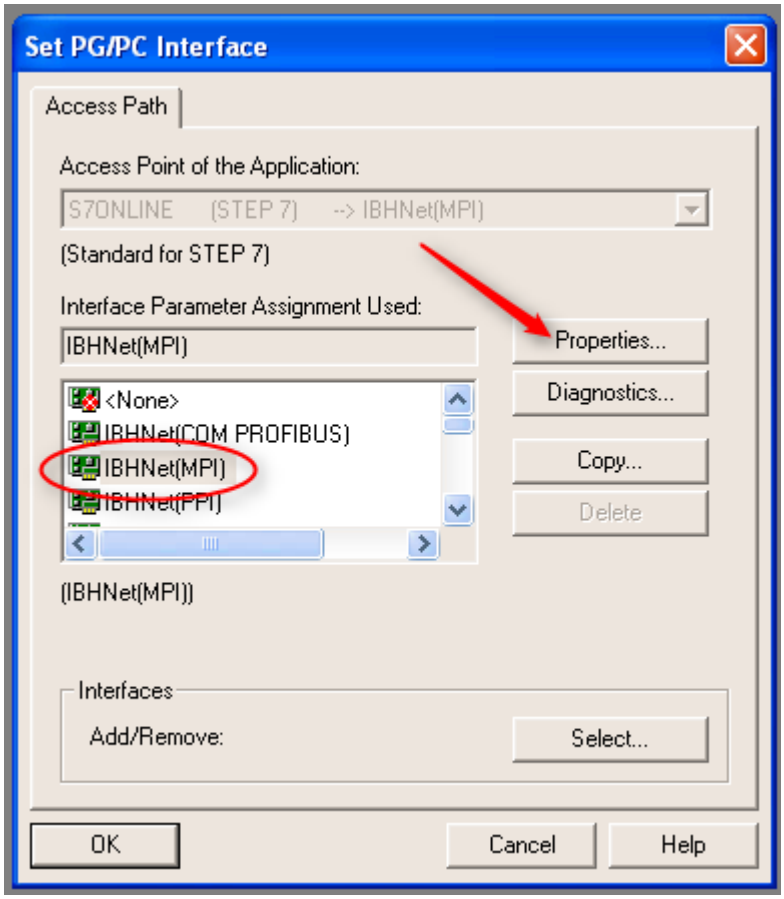
1. Set a static IP address on the NL-50 adapter that matches the subnet of the SiteManager DEV port. (For more details, refer to **Appendix B - Setting the IP address on the NL 50-MPI**)
2. Install the Step7 IBHNet driver from the CD that is included with the NL-50 adapter. Follow the on-screen instructions. Remember to restart your computer when the installation is finished.
3. In the LinkManager locate the agent that represents your NL-50 adapter, and connect to it.



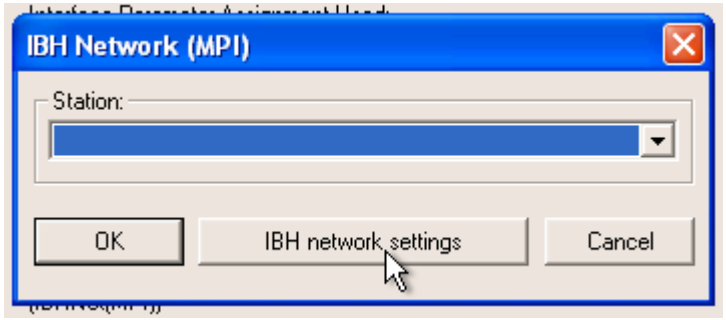
4. Start the SIMATIC Manager program, and click **Options → Set PG/PC Interface**.



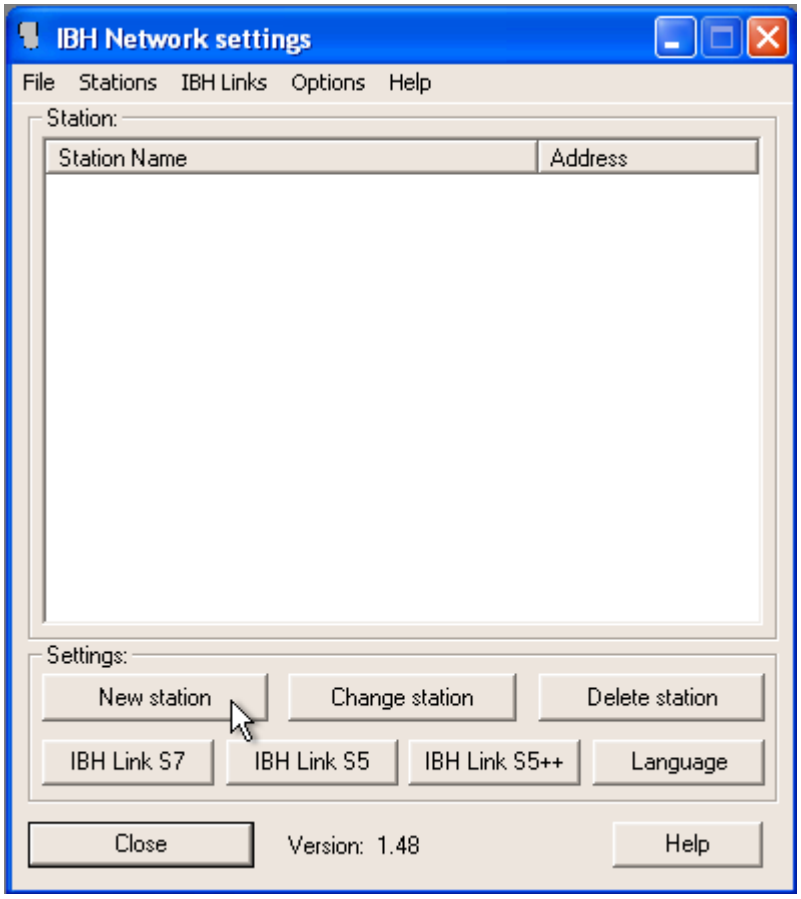
5. Select the “IBHNet(MPI)” interface from the list, and click **Properties**.



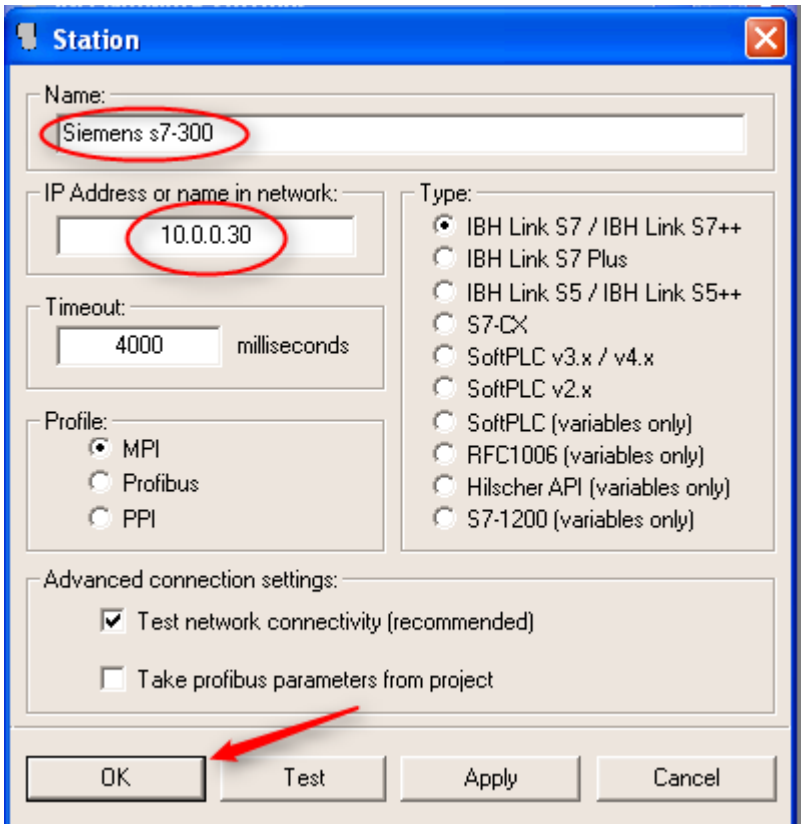
6. Click the **IBH network settings** button



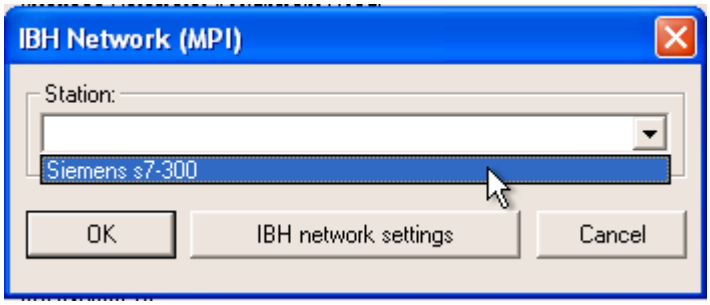
7. Click the **New station** button.



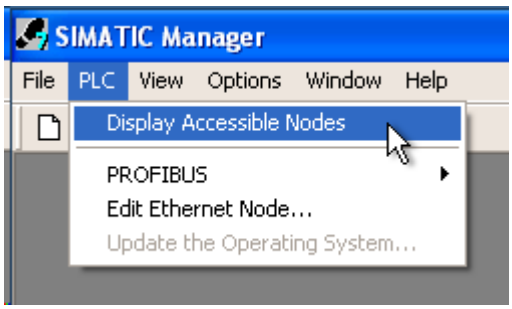
8. Give the station a name, so you can identify it later on, and type in the IP address of the NL-50 adapter. Click **OK** and **Close**.

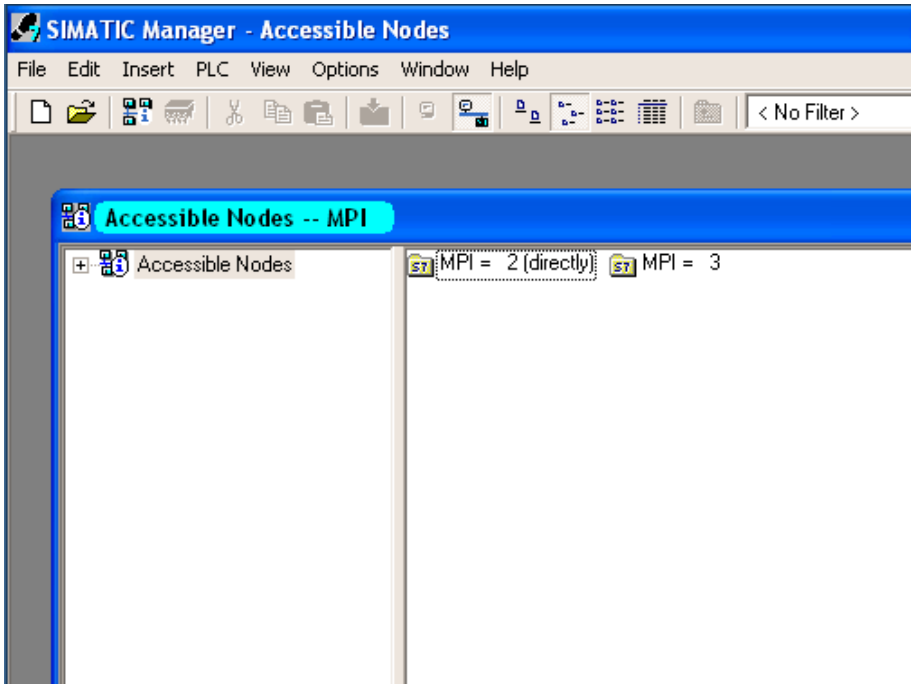


9. Select the station you just created from the dropdown list, and click **OK** twice.



10. Now, you should be able to access the PLC via the MPI. To get a list of available nodes, select **PLC → Display Accessible Nodes**.





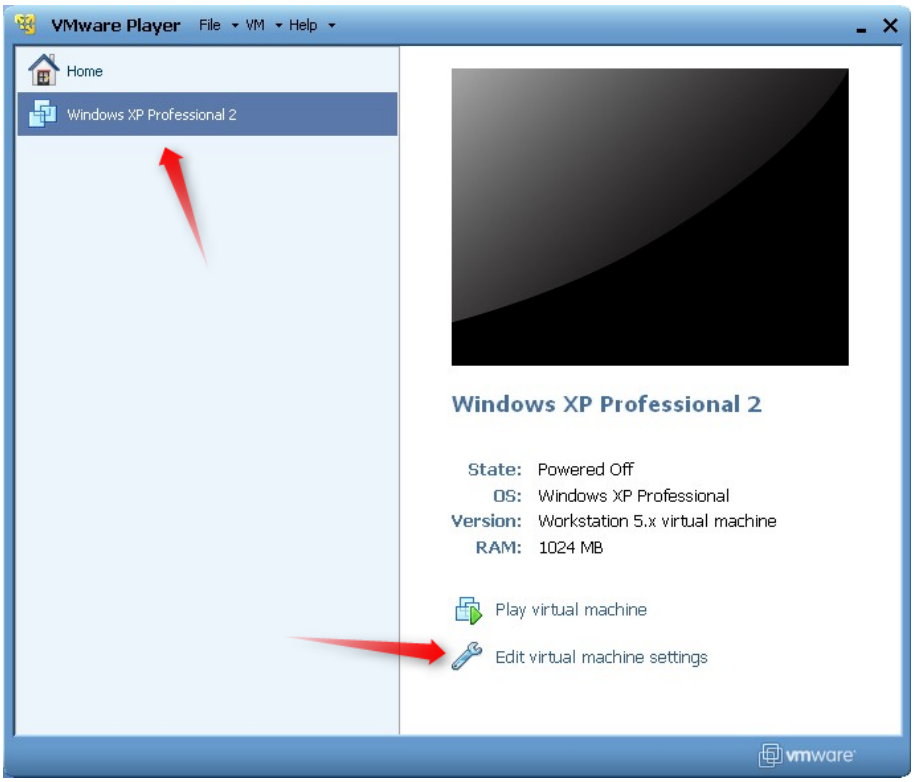
6. VMWare: TCP connection via native Siemens Ethernet port

You can run the Siemens software inside a VMWare engine, to a Siemens PLC that is Ethernet attached to a SiteManager.

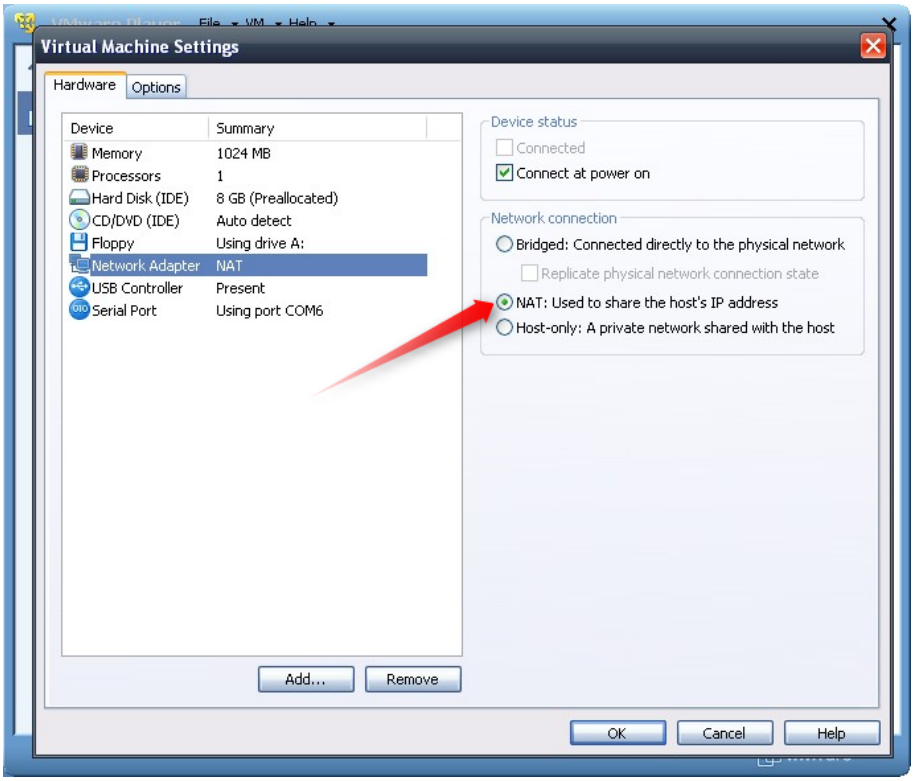
From LinkManager version 12155 you can choose to run the LinkManager inside or outside the virtual machine. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

The following illustrates VMWare Player, which can be downloaded from http://www.vmware.com/support/product-support/player/, and for LinkManager running outside the virtual machine (i.e. on the host OS system)

1. Locate your Windows XP that has Step7 installed, and enter **Edit virtual machine settings.**



2. Make sure the Network Adapter settings is set to **NAT** (If running LinkManager inside VMWare, you can run either **NAT** or **Bridged** mode)



3. Start the VMWare engine, and on the host PC start LinkManager.

4. Follow the procedure of section **1 STEP7: TCP connection via native Siemens** Ethernet port to get access to the PLC via LinkManager

7. VMWare: MPI connection via RS232-to-MPI Adapter

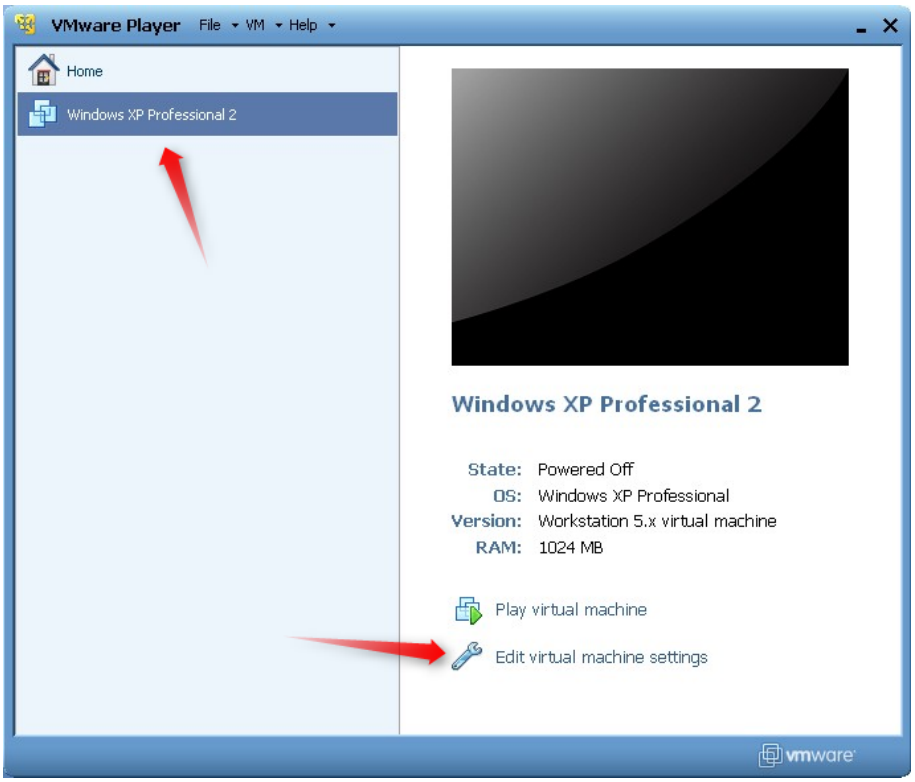
You can run the Siemens software inside a VMWare engine, to a Siemens PLC that is attached to a SiteManager via a MPI-to-RS232 adapter.

You can choose to run the LinkManager inside or outside the virtual machine. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

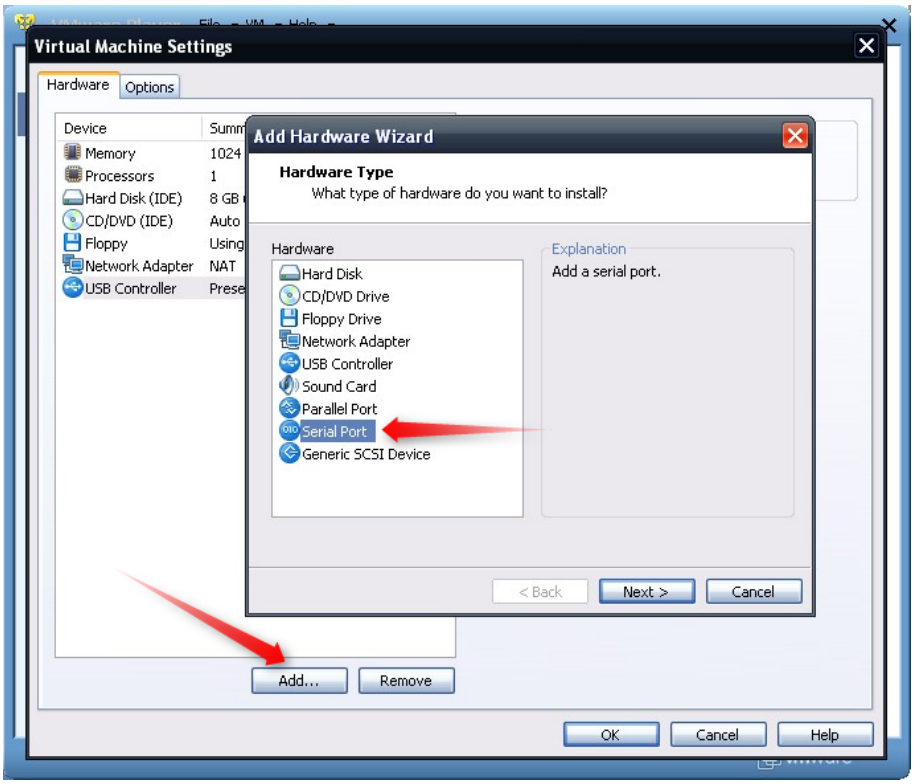
The following illustrates VMWare Player, which can be downloaded from http://www.vmware.com/support/product-support/player/, and for LinkManager running outside the virtual machine (i.e. on the host OS system)

1. Follow step 1-3 of section **3 MPI or PPI connection via** RS232-to-MPI/PPI Adapter. This will create a COM port even if the PC does not have a physical COM port.

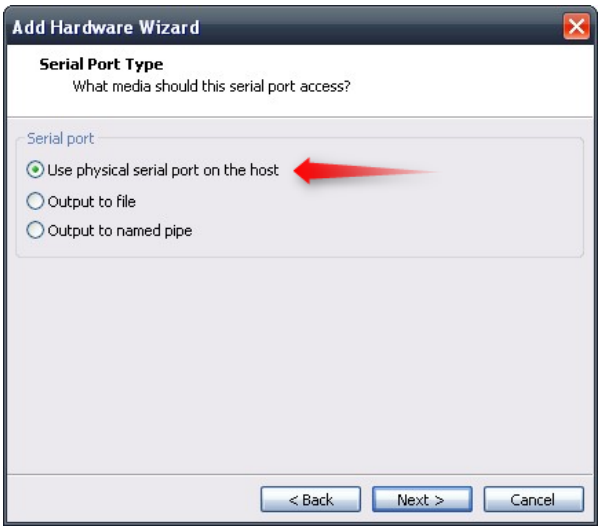
2. Locate your Windows XP that has STEP 7 installed, and without starting it, enter **Edit virtual machine settings.**



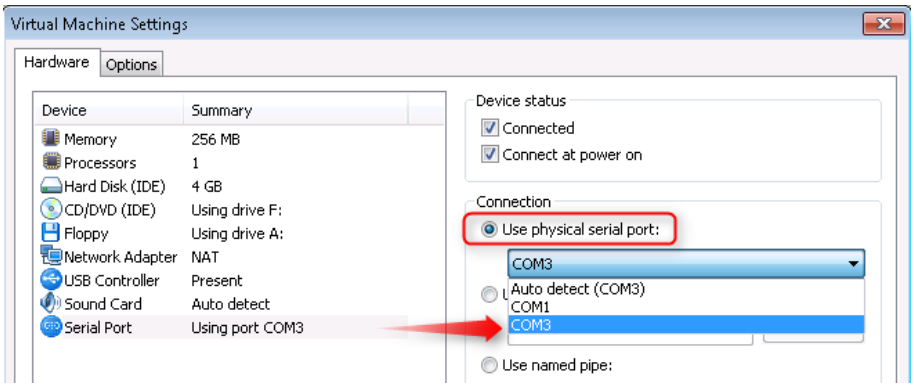
3. Add Serial Port to the Hardware list (if it does not already exist).



4. Select “Use physical port” (Even though LinkManager makes a virtual COM port, VMWare sees it as a physical port)



5. Set the port to the COM port used by the LinkManager (see section **3 MPI or PPI connection via** RS232-to-MPI/PPI Adapter)



6. If VMWare does not allow you to add a Serial port, it may be because the PC does not have a physical Serial port. But if you have started LinkManager and connected to the Agent, the virtual COM port of the LinkManager should be regarded as a physical COM port by VMWare.

7. Press **OK** twice, and select the Select **Finish** and **OK**, Start the VMWare WindowsXP image, and start the STEP 7 software.

8. Follow the procedure described in section Error! Reference source not found. Error! Reference source not found. on getting access to the PLC via LinkManager.

   Note: VMWare will typically make the physical COM port of the host system (e.g. COM3) appear to the virtual OS as COM1. You should configure STEP 7 to use the port of VMWare (COM1) and not the physical port of the host system (COM3) that is used by LinkManager.

7.1. Startup order of VMWare, LinkManager and STEP 7

If you have already preset a COM port in LinkManager as well as in VMWare, the startup order would be irrelevant. You can stop and start the components individually.

If you encounter problems, or you have changed the COM port setting of LinkManager it is recommended to try the following:

1. Stop the VMWare engine.
2. Stop LinkManager completely.
3. Start LinkManager.
4. Connect to the Serial PLC and check the assigned COM port under Status (by right-clicking the LinkManager tray icon)
5. Check the COM port settings of the Virtual Machine Settings of the Windows image with the STEP 7 software. (COM port should be COM1 or COM2, and not the virtual COM port assigned to the LinkManager)
6. Start the VMWare image.
7. Start STEP 7 and connect to the PLC

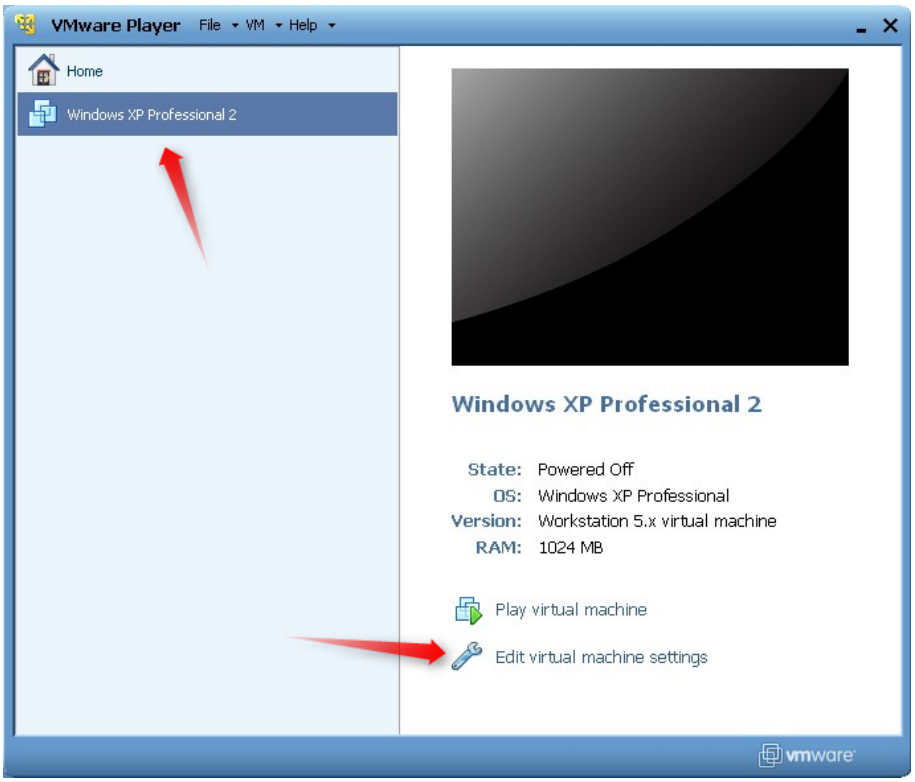
8. VMWare: MPI connection via Siemens PC USB Adapter

You can run the Siemens software inside a VMWare engine, to a Siemens PLC that is attached to a SiteManager via a MPI-to-USB adapter.

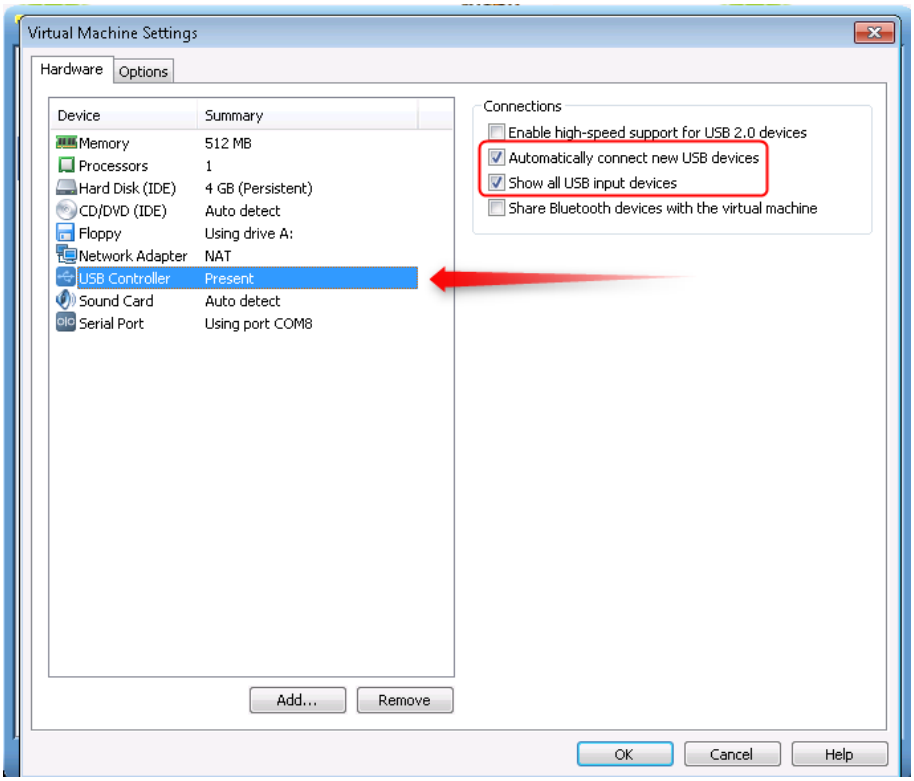
Important: LinkManager must run inside the virtual. Note that LinkManager can only run inside VMWare if the host OS is Windows 7 and the PC's CPU has support for virtualization.

The following illustrates VMWare Player, which can be downloaded from http://www.vmware.com/support/product-support/player/, and for LinkManager running outside the virtual machine (i.e. on the host system)

1. Locate your Windows XP that has Step7 or TIA portal installed, and enter **Edit virtual machine settings.**



2. Make sure that **USB Controller** has been added as Hardware component**:**



3. Start the VMWare engine and the LinkManager inside the VMWare engine.

4. Follow the procedure of section **4 MPI connection via Siemens PC USB Adapter** to get access to the PLC via LinkManager

Appendix A - Organizing COM ports in Windows

Clean up Windows Registry for redundant COM ports:

We have experienced that some versions of the Siemens software require a COM port number less than 7. In case your PC assigns a COM port of e.g. 13, it may be due to previous installs of virtual COM ports from in relation to installation of other programs.

You can clean your PC for redundant COM ports in Windows registry:

1. Open regedit (Start → run → Regedit)
2. Navigate to:

   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\COM Name arbiter
3. In the ComDB set all values to 00
4. Restart your PC

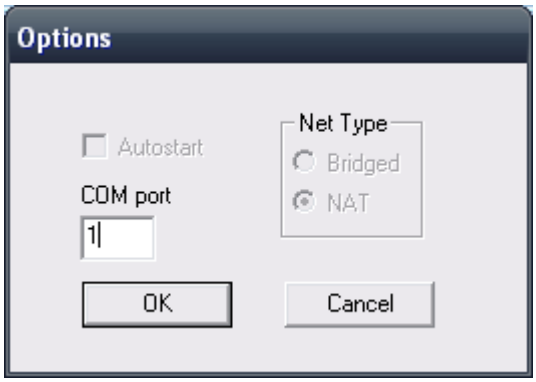
Enable LinkManager to use COM1:

Some Siemens programs (such as the “Flexible Transfer Tool”) require the COM port to be COM1.

Even if no COM ports are installed on the PC, Windows will never assign a COM port lower than COM3 to the LinkManager. You therefore have to do the following to force LinkManager to use COM1:

1. Open Windows Control Panel → System → Hardware → Device Manager → Ports (COM & LPT).
2. If there already are physical COM ports listed, you must re-assign the port numbers to free up COM1.

   Right click a COM port and select Properties → Port Settings → advanced
3. Change the COM port number in the drop down list.
4. Restart your PC.
5. Right click the LinkManager system tray icon and select Options.
6. Enter 1 in the COM port field.



7. Stop and Start the LinkManager and start the Serial agent.

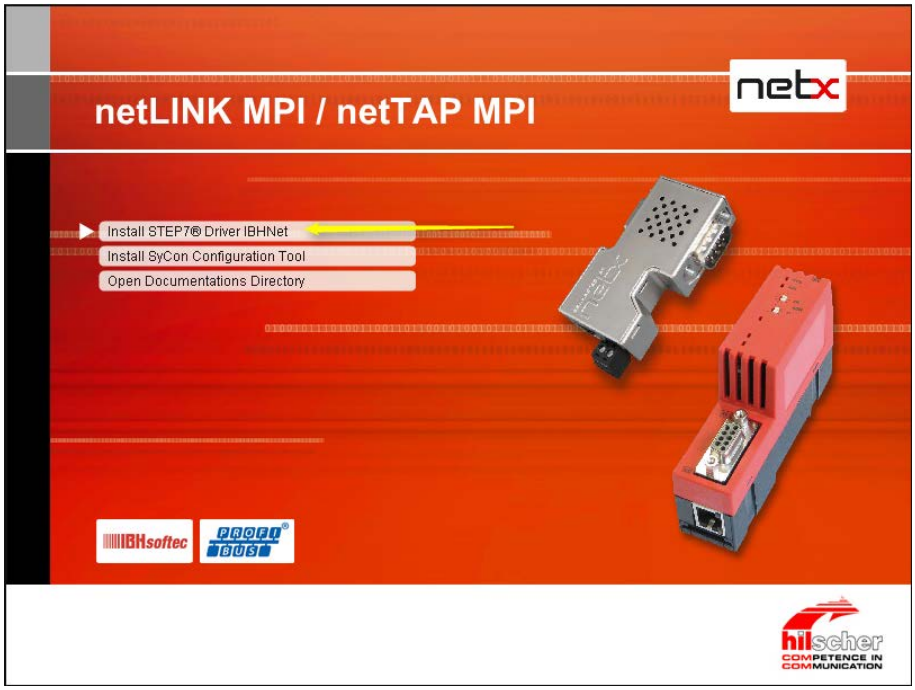
Appendix B - Setting the IP address on the NL 50-MPI Adapter

In order for the MPI adapter to work, you need to program the IP address permanently into the adapter locally, prior to shipping the adapter to the site.

Note that you <u>cannot</u> set the address remotely via the LinkManager connection.

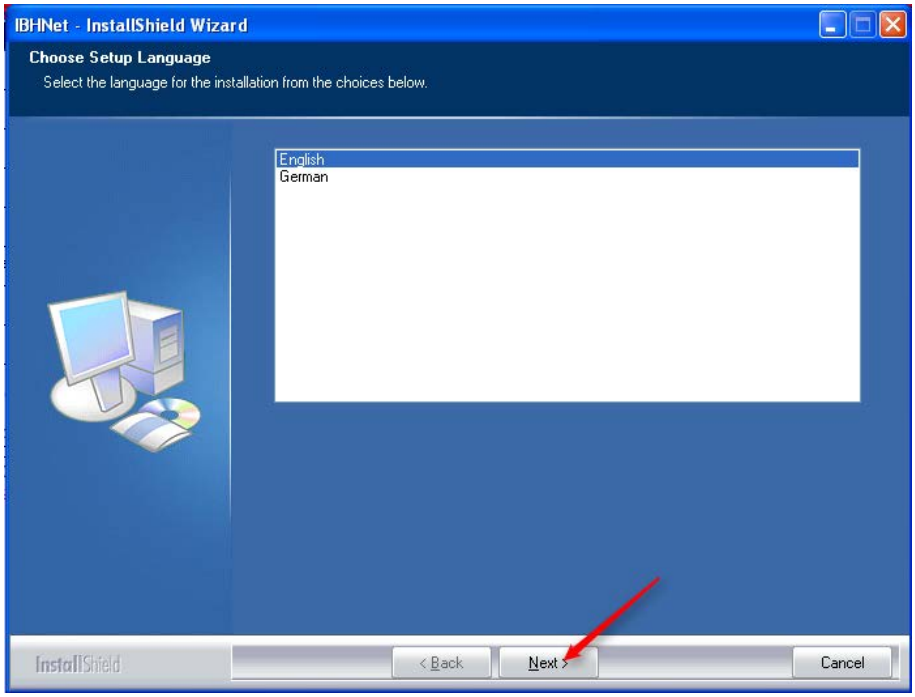
The following refer to the procedure for SIMATIC Step7. It is assumed that the same drivers works for the TIA Portal.

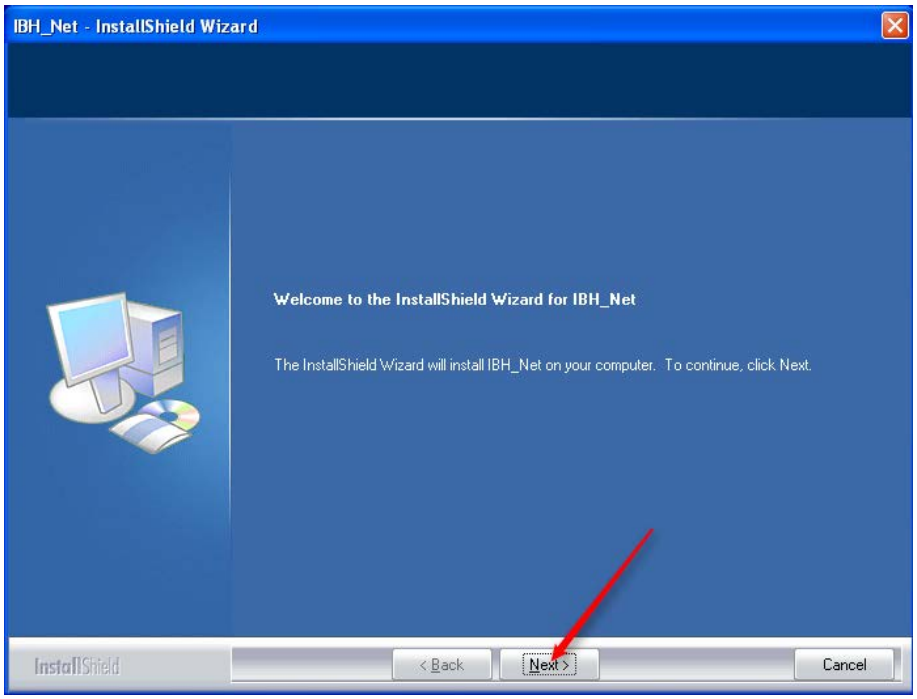
1. Install the software from the CD enclosed with the NL-50 adapter.
   Select “Install Step7® Driver IBHNet”.

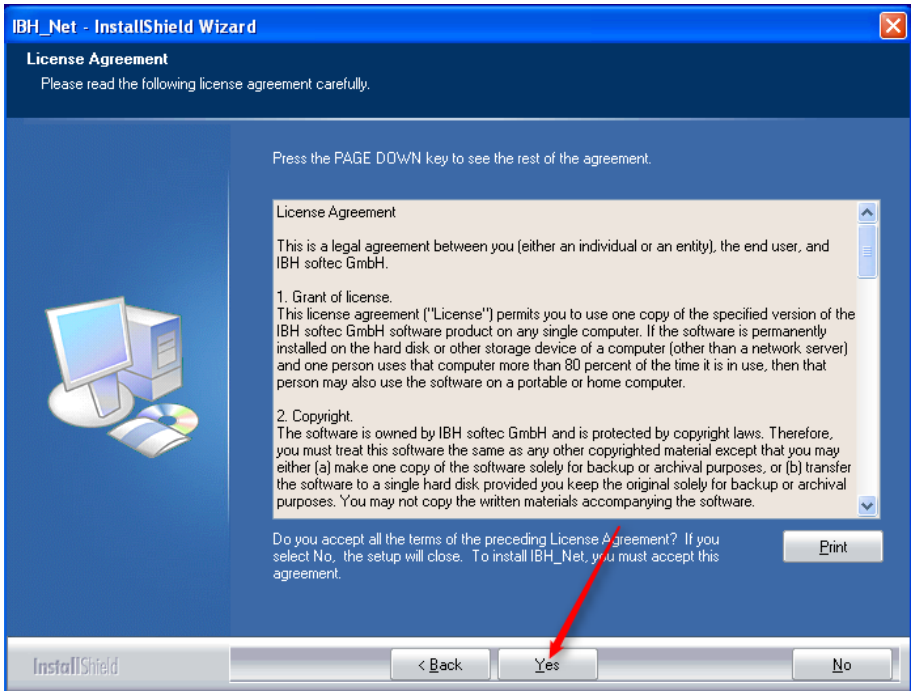


2. Next, “select IBHNet-Treiber installieren” (German for “Install driver”).

3. Follow the on-screen instructions.




IBH_Net - InstallShield Wizard
Welcome to the InstallShield Wizard for IBH_Net
The InstallShield Wizard will install IBH_Net on your computer. To continue, click Next.
InstallShield
< Back
Next >
Cancel


IBH_Net - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
License Agreement
This is a legal agreement between you (either an individual or an entity), the end user, and IBH softec GmbH.
1. Grant of license.
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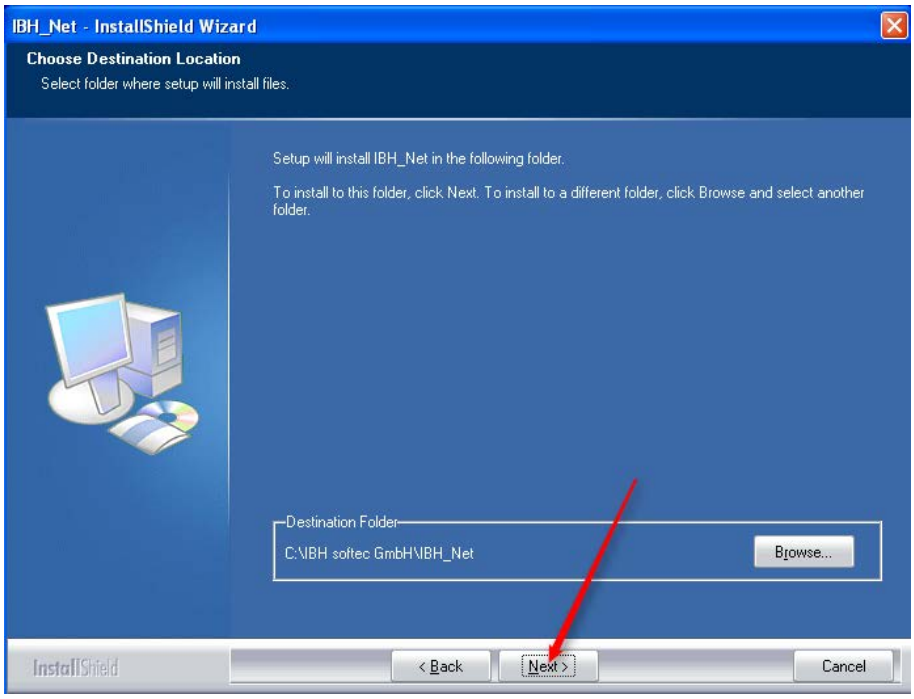
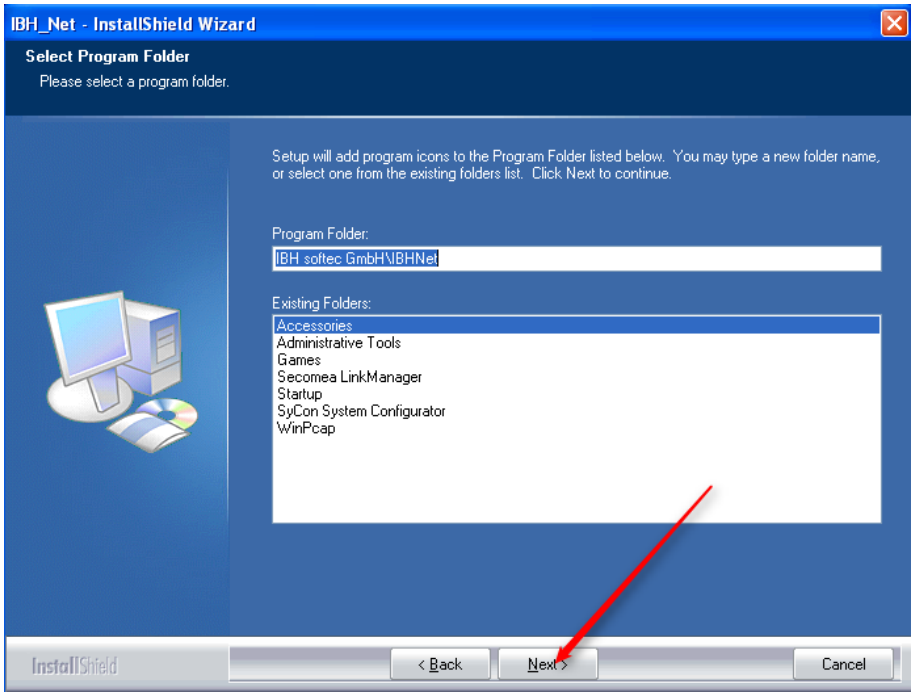
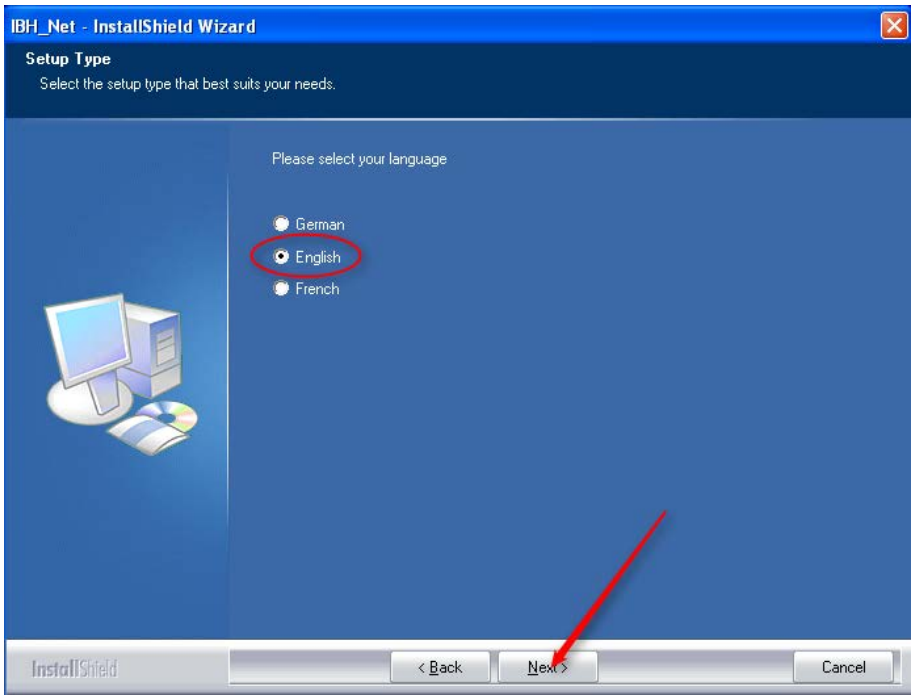
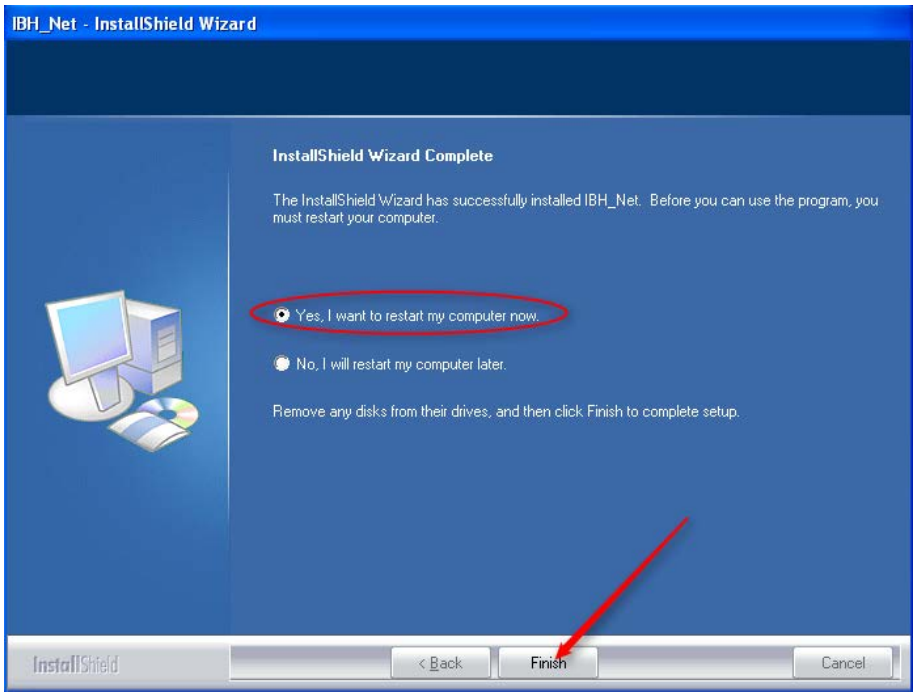
Do you accept all the terms of the preceding License Agreement? If you select No, the setup will close. To install IBH_Net, you must accept this agreement.
Print
InstallShield
< Back
Yes
No

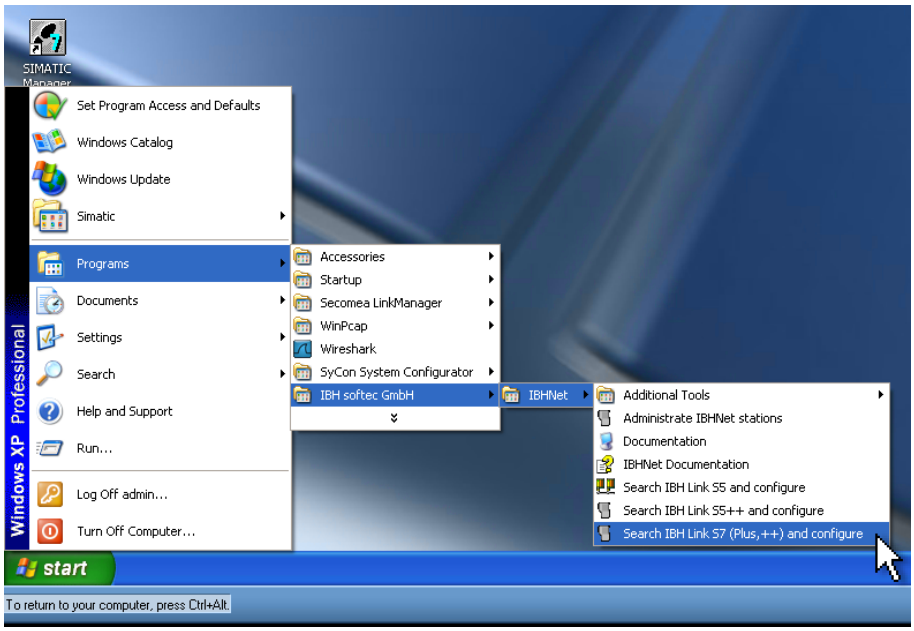

IBH_Net - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Setup will install IBH_Net in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\IBH softec GmbH\IBH_Net
Browse...
InstallShield
< Back
Next >
Cancel


IBH_Net - InstallShield Wizard
Select Program Folder
Please select a program folder.
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.
Program Folder:
IBH softec GmbH\IBHNet
Existing Folders:
Accessories
Administrative Tools
Games
Secomea LinkManager
Startup
SyCon System Configurator
WinPcap
InstallShield
< Back
Next >
Cancel

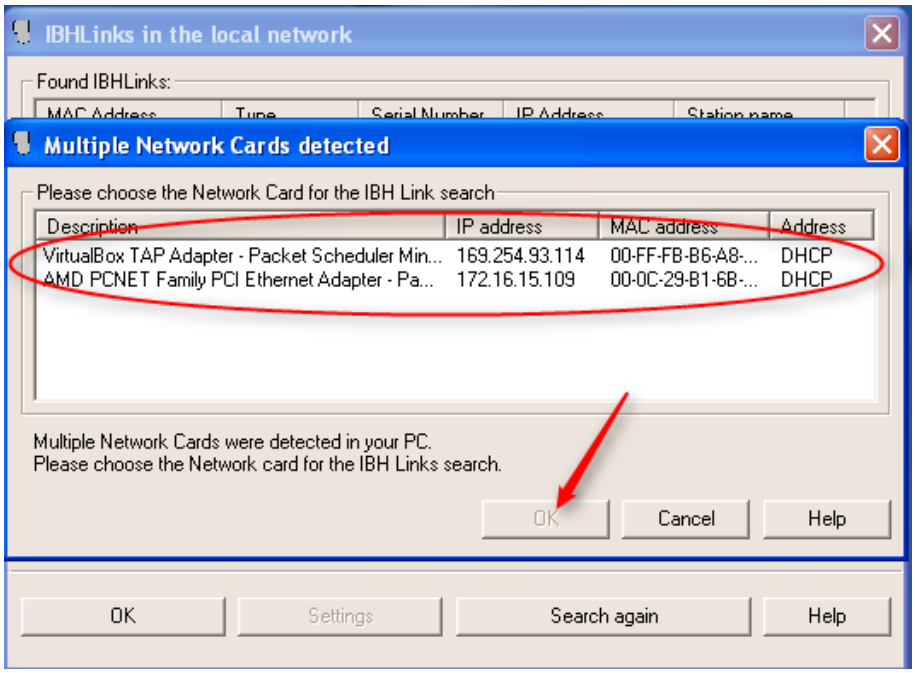

IBH_Net - InstallShield Wizard
Setup Type
Select the setup type that best suits your needs.
Please select your language
German
English
French
InstallShield
< Back
Next >
Cancel


IBH_Net - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed IBH_Net. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
InstallShield
< Back
Finish
Cancel

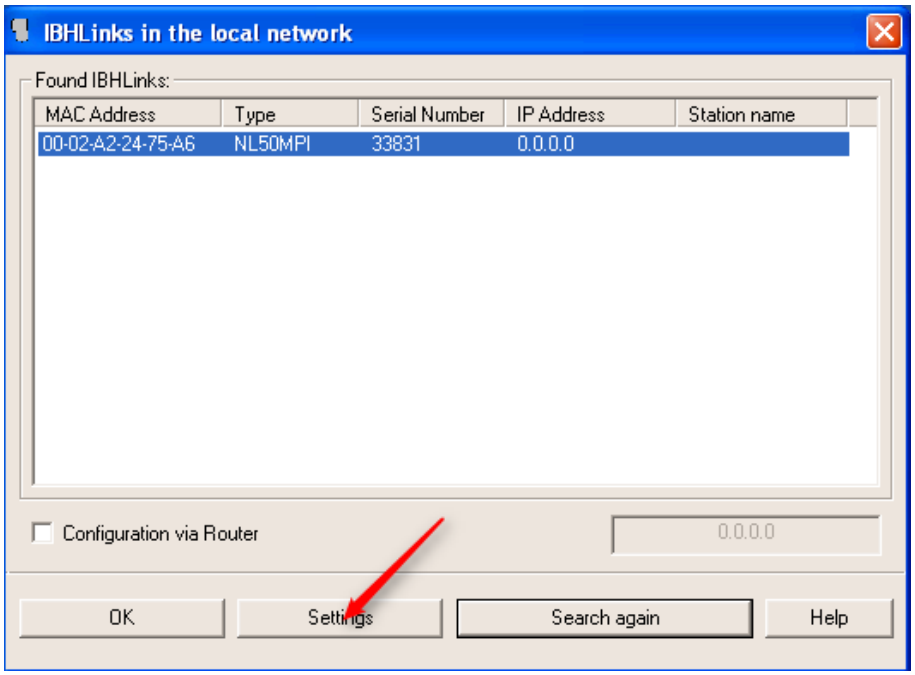
4. After reboot, start the “IBH Link S7” search application.



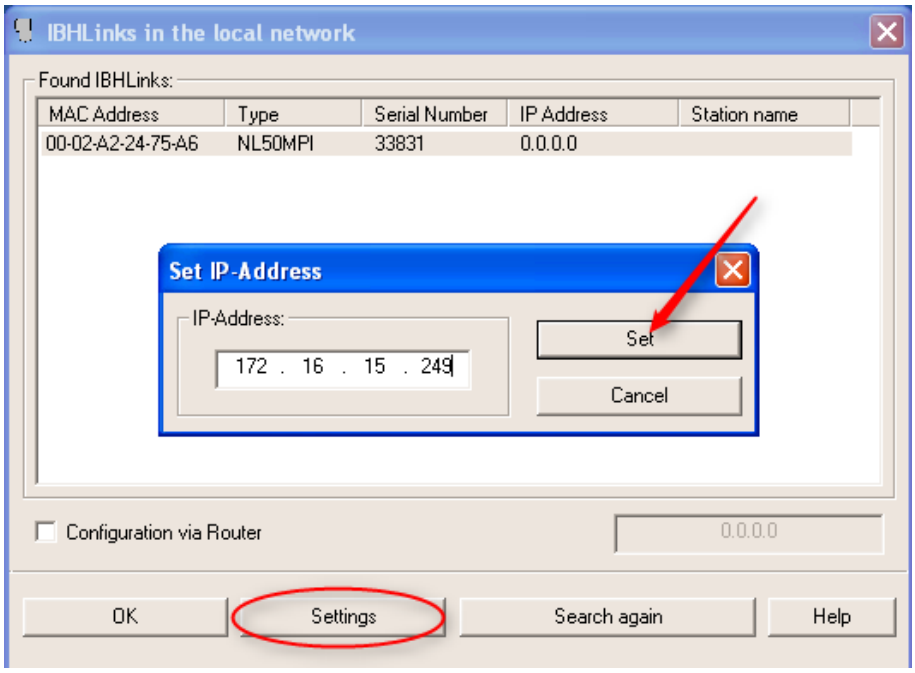
5. If you have more than one network adapter in your computer, select the one that the NL 50-MPI adapter is attached to, and click **OK**.



6. The software will automatically search for the MPI adapter, and it will show up on the screen. Select it, and click **Settings**.

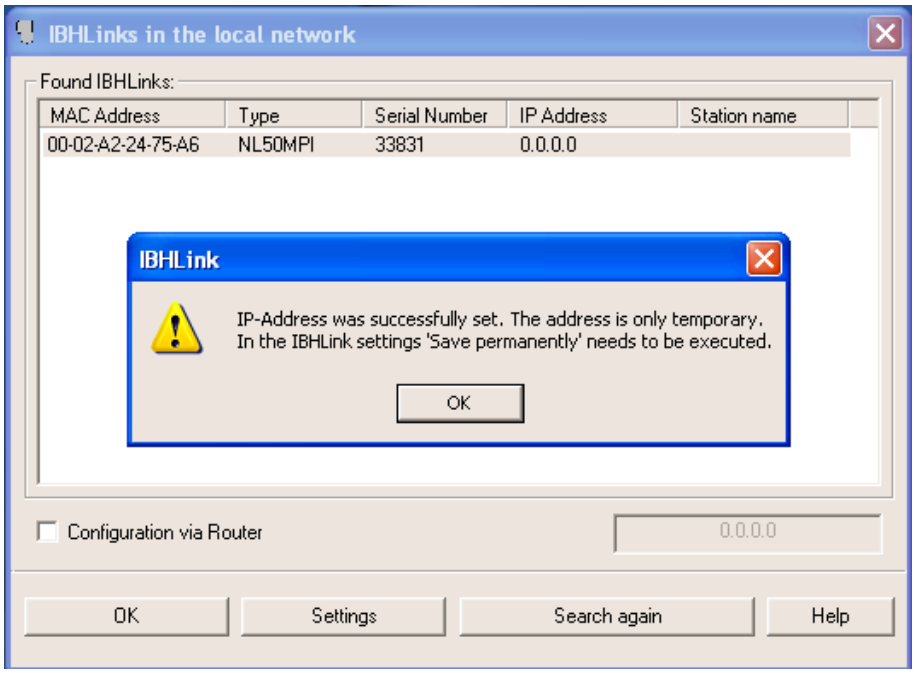


7. Give the adapter a temporary IP address **in the same subnet as the network adapter of your PC**, and click **Set**.

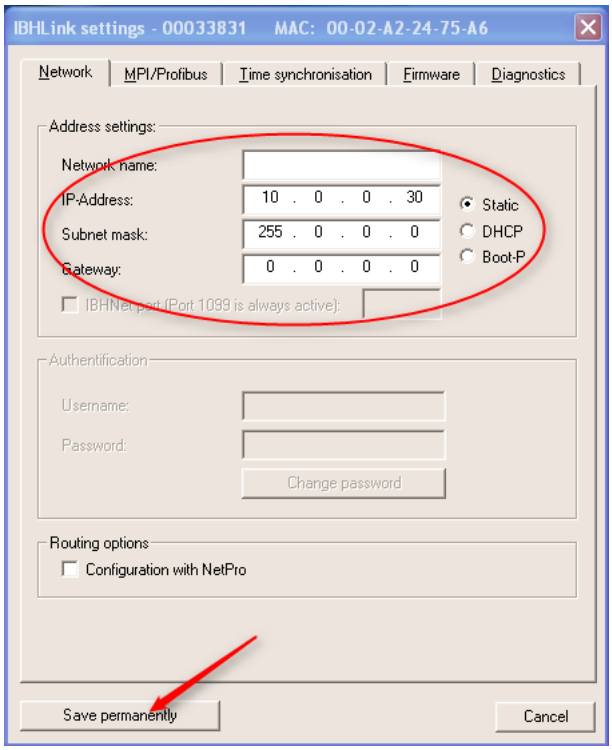


8. If the IP address is in the correct subnet, the software will tell you that it has set the IP address temporarily, and it needs to be saved permanently.

   Click **OK**, and then click **Settings** again.



9. Type in the IP address that should be used by the MPI adapter on the DEV network of the SiteManager. Press **Save permanently** and select **Yes** when prompted for restarting the adapter.



10. The MPI adapter is now configured with a permanent IP address, and is ready to be attached to the DEV side of the SiteManager.

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